Air Quality Permitting Statement of Basis

August 8, 2005

Permit to Construct No. P-050200

Potlatch Corporation, Clearwater Wood Products
Lewiston, ID

Facility ID No. 069-00003

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AIR QUALITY DIVISION

FINAL

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Acronyms, Units, and Chemical Nomenclatures

acfm	actual cubic feet per minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
Bf/yr	board feet per year
BH	baghouse
Btu	British thermal unit
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
dscf	dry standard cubic feet
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
gr/dscf	grains per dry standard cubic feet
gr	grain (1 lb = 7,000 grains)
HAPs	Hazardous Air Pollutants
hp	horsepower
hr/yr	hours per year
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
km	kilometer
lb	pound
lb/hr	pound per hour
m	meter(s)
MACT	Maximum Achievable Control Technology
Mbf/hr	thousand board feet per hour
Mbf/yr	thousand board feet per year
MMbf/yr	million board feet per year
MMBtu	million British thermal units
NA	not applicable
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NSPS	New Source Performance Standards
O_3	ozone
ORCAA	Olympic Region Clean Air Agency
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
ppm	parts per million
PSD	Prevention of Significant Deterioration
PTC	permit to construct
PTE	potential to emit

Acronyms, Units, and Chemical Nomenclatures Cont.

Rules	Rules for the Control of Air Pollution in Idaho
scf	standard cubic feet
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SM	Synthetic Minor
SO_2	sulfur dioxide
SO_x	sulfur oxides
T/yr	tons per year
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

Potlatch Corporation operates the Clearwater Wood Products facility which manufactures dimensional kiln-dried lumber and trim board products. Wood waste in the forms of sawdust and chips are also produced as marketable products. Clearwater Wood Products is located in Lewiston, Idaho.

The facility is comprised of sawmill, lumber drying, surfacing, and Lewiston Cedar Products departments.

Raw logs are debarked and cut to desired lengths before entering the sawmill building. In the sawmill building the cut and debarked logs are cut to maximize the amount of lumber obtained from each log. The rough-cut green lumber is stacked before being dried in the kilns.

The existing lumber drying portion of the facility consists of 31 single-track masonry drying kilns constructed in the 1930's, manufactured by Moore, and one double-track kiln, manufactured by LSI and constructed in 1988. These kilns are indirectly-fired by design and operate on steam obtained from the adjacent Potlatch Pulp and Paper facility.

Dried lumber is removed from the kilns and either stored temporarily or sent to the surfacing department where the lumber is trimmed by saws, planed, sorted, stacked, strapped, and stored before shipment as final dimensional lumber product.

Lewiston Cedar Products (also referred to as the Profiling and Specialties Departments) obtains dimensional lumber from Clearwater Wood Products' surfacing department or outside suppliers. The lumber is planed, finger-jointed and glued, planed again if needed, and sanded. Dimensional trim board is either strapped for shipment or is profiled to a desired shape, and prepared for shipment.

Wood chips, sawdust, planer dust, and sander dust from process equipment are conveyed to storage areas by either conveyor belt or pneumatic conveyance systems employing cyclones or baghouses. The PTC application materials contain process flow diagrams and more detailed process descriptions.

The proposed modification consists of replacing the existing operational drying kilns with four double-track kilns. The kilns are indirectly-fired and operate on processed steam obtained from the adjacent Potlatch Pulp and Paper facility. The 32 existing kilns will operate concurrently with the four proposed Wellons kilns during a shakedown period of fine-tuning of the four Wellons kilns. After the Wellons kilns have been determined to operate according to the permittee's process requirements for a period not to exceed six months, the 32 existing kilns will be decommissioned.

3. FACILITY / AREA CLASSIFICATION

Potlatch Clearwater is defined as a major facility because potential emissions of methanol, which is a HAP, are greater than 10 tons per year. As presented in the application, the existing facility is a major source of NO_x, with potential emissions greater than 100 T/yr. Potential emissions of VOCs are greater than 100 tons per year after issuance of this modification. The AIRS classification for this facility is defined as "A". The facility is not classified as a major source for PSD. The AIRS data entry table is provided in Appendix A.

The facility is located within AQCR 62 and UTM zone 11. The facility is located in Nez Perce County which is designated as attainment or unclassifiable for all criteria pollutants (CO, NO_x, PM_{10}, SO_2, lead, and ozone).

4. APPLICATION SCOPE

The Department of Environmental Quality (DEQ) received a PTC application on January 4, 2005 to replace the facility's 32 existing lumber drying kilns with four new lumber drying kilns. A 15-day pre-permit construction approval application was received on March 18, 2005 for the same project. The four new kilns are more efficient than the existing kilns and have a greater production capacity. The 32 existing kilns have an estimated maximum production capacity of 237,628,000 bf/yr. The existing kilns are proposed to be replaced with four new kilns with a combined maximum production capacity of 351,009,000 bf/yr.

The permittee has requested that the existing and new kilns be allowed to operate concurrently for a shakedown period expected to be less than six months. The maximum annual production capacity of 351.009 MMbf/yr is the operating limit for all existing and new kilns when operating concurrently, and for the four new Wellons kilns after the existing kilns have been decommissioned.

4.1 Application Chronology

January 4, 2005	DEQ received an application for a PTC, designated project number P-050200 from Geomatrix Consultants, Inc., on behalf of the Potlatch Corporation, Clearwater Wood Products facility.
February 3, 2005	The application was declared complete.
March 18, 2005	DEQ received a 15-day pre-permit construction approval application from Geomatrix Consultants, Inc., on behalf of the Potlatch Corporation, Clearwater Wood Products facility. This submittal replaces the PTC application materials initially received on January 4, 2005, and all submittals received up to the March 18, 2005 submittal. The March 18, 2005 submittal and any supplementary materials are to be used as the basis for issuing the PTC for the kiln replacement project.
March 18, 2005	DEQ received a request from Potlatch Clearwater to review a facility draft PTC.
March 24 and April 1, 2005	DEQ received additional information for the PTC application concerning information requested by DEQ on the original PTC application materials.
April 1, 2005	DEQ issued pre-permit construction approval for the proposed project.
April 15, 2005	DEQ declared the 15-day pre-permit construction approval application complete.
May 20, 2005	DEQ received notification that Potlatch does not request a facility draft of the PTC package.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 *Equipment Listing*

Existing Kilns

The facility operates 31 existing masonry kilns, manufactured by Moore. These kilns were constructed prior to 1930. Potential annual production capacity of each Moore kiln is 6,812 Mbf/yr, drying Douglas fir, for a total capacity of the 31 kilns of 211,165 Mbf/yr. Emissions are uncontrolled.

One double-track kiln, manufactured by LSI, was constructed in 1988. Potential annual production capacity of the LSI kiln is 31,755 Mbf/yr, when drying Douglas fir. Emissions are uncontrolled.

Proposed Replacement Kilns

The facility proposes to construct and operate four identical double-track kilns. The kilns are Model No. 104 ft DT (double track kiln, 104 feet in length), manufactured by Wellons. The annual kiln capacity for each kiln is 87,752 Mbf/yr, or 351,009 Mbf/yr for all four kilns when drying Douglas fir species. Emissions are uncontrolled.

5.2 *Emissions Inventory*

Emissions associated with this project at the Potlatch Clearwater Wood Products (Potlatch Clearwater) facility include criteria, hazardous, and toxic air pollutants from the new and existing lumber drying kilns and the sawmill and surfacing departments process emissions points—which consist of process cyclones and baghouses. Potential emissions increases of SO_2, PM_{10}, VOCs, NO_x, and CO resulting from increased steam demand from Power Boiler No. 4, which is operated by Potlatch Pulp and Paper Division, a separate and adjacent facility, were also analyzed by the permittee for NAAQS compliance.

Potlatch submitted an emissions inventory for PM_{10} emissions from sources at Potlatch Pulp and Paper and Consumer Products Divisions in support of the ambient impact analysis for this project. These emissions are not included in the following tables. Potlatch Clearwater is a separate facility from the Pulp and Paper and Consumer Products facilities. Please refer to the PTC application materials or the DEQ modeling review memorandum in Appendix B to review emission estimates for the Pulp and Paper and Consumer Products facilities. Emission estimates were checked by DEQ staff and were found to be acceptable.

The assumptions presented by the permittee in Sections 4.2 (page 19) and 4.3 (page 20) of the 15-day pre-permit construction approval application, concerning existing actual production capacities and the hourly emissions increases associated with the increase in potential lumber production appear reasonable.

Lumber Drying Kilns

The permittee presented worst-case emission estimates for the wood species that are to be processed at this facility. Tables 5.1 and 5.2 contain the emission factors used in the permittee's application. The emission factor documentation is contained in Appendix D of this memorandum.

Emission factors for each pollutant emitted are in units of lb pollutant per thousand board feet of lumber throughput. The permittee assumed 100% utilization of kiln drying capacity to estimate PTE. Actual emissions were estimated using the recorded throughput of lumber for each species within that calendar year and multiplying by the appropriate emission factor for that species, or by a generic emissions factor, if a species-specific factor was not used. Emissions from lumber drying kilns were estimated for PM_{10}, individual HAPs, and individual TAPs.

For existing facility PTE, the permittee assumed the highest emitting species of wood for each pollutant being processed at the potential production rate of 237.6 MMbf/yr. The same approach was used for establishing future potential emissions using the throughput of 351.009 MMbf/yr throughput.

Table 5.1 VOCS, PM, AND PM_{10} EMISSION FACTORS

Pollutant	Wood Specie	Emissions Factor (lb/Mbf)[b]	Source of Emission Factor
PM/PM_{10}[a]	Hemlock	0.05	Oregon Department of Environmental Quality, Emission Factors, Wood Products AQ-EF02, June 26, 2003 PM_{10} fraction from Oregon DEQ, Emission Factors, Wood Products, AQ-EF03, April 25, 2000
	Fir/Larch	0.02	
	Cedar	0.04	ORCAA[e], Dry Kiln Emission Factors, April 8, 1999
VOCs[c]	Hemlock	0.14	ORCAA, Dry Kiln Emission Factors, April 8, 1999
	Fir/Larch[d]	0.61	Oregon Department of Environmental Quality, Emission Factors, Wood Products AQ-EF02, June 26, 2003
	Cedar	0.25	ORCAA, Dry Kiln Emission Factors, April 8, 1999

a) Particulate matter/particulate matter with a mean aerodynamic diameter of ten micrometers or less
b) pounds per thousand board feet
c) volatile organic compounds
d) Douglas fir emission factor is worst-case for fir/larch category.
e) Olympic Region Clean Air Agency

Table 5.2 TAPS EMISSION FACTORS REPRESENTING WORST CASE WOOD SPECIE

TAP	Wood Specie	TAP Emissions Factor (lb/Mbf)	Source of Emission Factor
Acetaldehyde	Generic	0.0078	K. Hanks and D. Bullock, MRI, to M. T. Kissel, EPA, Baseline Emissions Estimates for the Plywood and Composite Wood Products Industry, June 9, 2000
Formaldehyde	White fir	0.0028	Oregon State University Small-scale Kiln Study, M. Milota, September 29, 2000
Methanol	White fir	0.12	Oregon State University Small-scale Kiln Study, M. Milota, September 29, 2000
Methyl Ethyl Ketone	Generic	0.0013	K. Hanks and D. Bullock, MRI, to M.T. Kissel, EPA, Baseline Emissions Estimates for the Plywood and Composite Wood Products Industry, June 9, 2000
Phenol	Douglas Fir	0.004	ORCAA, Dry Kiln Emission Factors, April 8, 1999

Cyclones

PM_{10} emissions from the cyclones were estimated by the permittee using a spreadsheet incorporating empirical equations used to predict the emission control efficiency for the particle size distribution of the woodwaste material handled by the individual cyclone. The exhaust flow rate and physical dimensions of the cyclone are used by the calculation algorithm. The result is a unique emission factor for each cyclone in units of pounds per ton of woodwaste throughput that is used to calculate PM emissions. The permittee assumed PM_{10} emissions were equal to PM emissions, which is a conservative assumption for cyclone emissions. No other regulated air pollutants are anticipated to be emitted by the cyclones. Individual cyclone emissions factors generated by the permittee are contained in Appendix D of this memorandum.

The permittee established the potential emissions increase for each cyclone that could be realized due to the increased kiln production capacity. Woodwaste product throughputs for each of the cyclones were taken from 1999 recorded data to establish a basis to evaluate the potential increase in woodwaste product throughput. To estimate existing potential PM/PM_{10} emissions, the 1999 annual woodwaste throughput in units of tons per year was multiplied by the ratio of the existing facility's potential lumber production capacity of 237.6 MMbf/yr to the 1999 actual production of 151.6 MMbf/yr.

Current PTE (T/yr) = Emission Factor (lb/ton woodwaste) * 1999 Woodwaste Throughput (T/yr) *

((237.6 MMbf/yr current PTE throughput) / (151.6 MMbf/yr)) * (1 ton / 2000 lb)

Future potential PM/PM_{10} emissions were calculated in the same manner as current PTE values, except that a future PTE throughput value of 351.6 MMbf/yr was used.

Baghouses

The permittee based estimates of PM_{10} emissions on a manufacturer's guaranteed grain loading of 0.003 gr/dscf of airflow. Airflow for each baghouse is determined by the fan system capacity. Grain loading emission rates were converted to pounds per hour using conversion factors of 7000 grains per pound and from pounds per hour to tons per year using a worst case assumption of 8,760 hours per year operation for each baghouse and a conversion factor of 2000 pounds per ton.

Future potential PM and PM_{10} emissions for the proposed project were estimated by establishing the number of operating hours at 4,280 hr/yr for the baghouses during the past for the production of 183,881 Mbf of lumber. The average hourly production rate per hour of operation was determined to be 42.96 Mbf/hr. The requested potential production of 351,009 Mbf/yr was divided by actual average hourly production rate to derive a value of 8,170 hr/yr that would be needed to process the 351,009 Mbf/yr of lumber.

Annual future potential emissions were estimated by multiplying the grainloading factor by the individual baghouse's air flow rate, 8,170 hr/yr operation. These values were converted from grains of emissions to tons of emissions per year.

The hourly PM and PM_{10} emissions increases for this project were estimated by multiplying the hourly emission rate established by the grainloading factor and fan capacity for the baghouse system by the hours of operation for actual emissions (16 hours per day to account for two shifts), and future potential emissions (24 hours per day to account for three shifts). The actual hourly emissions were subtracted from the future potential emissions to estimate the increase in emissions.

Internal Combustion Engines

The facility operates four diesel-fired internal combustion engines to run four emergency firewater pumps. Each engine is rated at 170 hp, and the permittee estimated PM_{10}, SO_2, VOCs, CO, and NO_x emissions using AP-42 emission factors from Section 3.3—Gasoline And Diesel Industrial Engines, October 1996. For existing and future potential emissions, 8,760 hours per year of operation were used in the emission estimates. Actual operating hours are 52 hours per year at one hour per week. Emergency operation is not accounted for in the typical 52 hours per year of operation.

Profiles and Specialties Department Edge and Finger Joint Gluing and Future Potential PM/PM_{10}

The Profiles and Specialties Department is also referred to as the Lewiston Cedar Products Department. The operational independence of this department from the rest of the facility is pertinent to establishing the modification's potential emissions increases for all profiles and specialties process cyclones and baghouses. There are no PM and PM_{10} increases associated with this department.

The existing facility PTE for VOCs was estimated by the permittee by scaling the highest annual glue usage rates for 2002 and 2003 to a rate that reflects 8,760 hours of operation as worst-case approach.

Table 5.3 contains the potential to emit for the Clearwater Wood Products facility for regulated air pollutant emissions following issuance of PTC No. P-050200. Table 5.4 contains a summary of the TAPs emission rates used in this permitting analysis to account for the increases in TAPs emissions for this project. The detailed emissions inventory submitted by Potlatch is included in Appendix B of this memorandum.

Table 5.3 FACILITY POST-MODIFICATION ANNUAL POTENTIAL EMISSION INVENTORY

Emission Unit/Source	PM[a]	PM_{10}[b]		VOCs[c]	CO[d]	NO_x[e]	SO_2[f]
	(T/yr)[g]	(lb/hr)[j]	(T/yr)	(T/yr)	(T/yr)	(T/yr)	(T/yr)
Kiln Vents[h]	6.64[i]	1.51	6.64	107.1			
Cyclone CY-1	0.14	0.07	0.14				
Cyclone, CY-2	0.03	0.02	0.03				
Cyclone, CY-3	0.06	0.03	0.06				
Cyclone, CY-4	0.35	0.17	0.35				
Cyclone, CY-6	0.21	0.11	0.21				
Cyclone, CY-18	0.02	0.004	0.02				
Cyclone, CY-25	0.64	0.16	0.64				
Cyclone, CY-26	0.02	0.01	0.02				
Cyclone, CY-27A	0.07	0.02	0.07				
Cyclone, CY-27B	0.07	0.02	0.07				
Surfacing Baghouse, BH-1	4.06	0.93	4.06				
Surfacing Baghouse, BH-2	4.28	0.98	4.28				
Surfacing Baghouse, BH-3	4.62	1.05	4.62				
Profile Baghouse, BH-4	5.07	1.16	5.07				
Profile Baghouse, BH-5	4.84	1.11	4.84				
Profile Baghouse, BH-6	3.94	0.90	3.94				
Profile Baghouse, BH-7	3.72	0.85	3.72				
Edge and Finger Joint Gluing, GL-1				3.55			
IC Engines, Firewater Pumps, IC-1, IC-2, IC-3, IC-4, IC-5 Aggregated Emissions	6.55	1.48[k]	6.55	7.36	19.97	92.30	6.11
IC Engine, Greenhouse Generator, IC-5	1.21	0.28	1.21	1.35	3.66	16.99	1.12
Facility-wide totals (T/yr)	**46.54**	**10.86**	**46.54**	**119.36**	**23.63**	**109.29**	**7.23**

a) Particulate matter
b) Particulate matter with a mean aerodynamic diameter of ten micrometers or less
c) Volatile organic compounds
d) Carbon monoxide
e) Nitrogen dioxide
f) Sulfur dioxide
g) Tons per year
h) Emissions related for all existing and proposed drying kilns during the concurrent operation period, and emissions related to operation of only the proposed Wellons drying kilns after the existing kilns have been decommissioned.
i) PM emissions were assumed to be equal to PM_{10} emissions.
j) Hourly PM_{10} emissions for aggregated kiln vent emissions for the four proposed Wellons kilns or the four proposed Wellons kilns and 32 existing Moore and LSI kilns.
k) Hourly PM_{10} emissions for the four firewater pumps are aggregated.

Table 5.4 SUMMARY OF POST-MODIFICATION TAPS EMISSION RATES

TAP Substance	TAPs Emissions[a] (lb/hr)	Screening Emissions Rate (lb/hr)	Modeling Required? Yes or No	TAPs Emissions[b] (T/yr)
Actetaldehyde[c]	0.15(0.31)	0.003	Yes	0.65
Formaldehyde	0.053	0.00051	Yes	0.23
Methanol	2.289	17.3	No	10.03
Methyl Ethyl Ketone	0.025	39.3	No	0.11
Phenol	0.076	1.27	No	0.43

a) Net emissions increase based upon future potential emissions minus the current actual average 2002 and 2003 emissions from the existing drying kilns. Hourly emissions are based on annual emissions averaged over 8,760 hours per year of operation.
b) Annual TAPs emissions increase based upon future potential emissions minus the current actual average emissions for 2002 and 2003 for the existing drying kilns.
c) Acetaldehyde emissions were considered to be controlled emissions based on 351,009 Mbf/yr of lumber throughput during concurrent operation of all kilns. Emissions from production of 351,009 Mbf/yr of lumber are represented in the emission rate listed in parentheses. The permittee modeled 0.31 lb/hr of acetaldehyde emissions.
d) Formaldehyde emissions were netted in accordance with IDAPA 58.01.01.210.09 and modeled in accordance with IDAPA 58.01.01.210.10.

5.3 Modeling

The permittee supplied NAAQS and TAPs ambient impact demonstrations in support of the PTC application. DEQ's memorandum concerning the review of these ambient impact demonstrations is included in Appendix C of this memorandum.

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 .... Permit to Construct Required

Potlatch Clearwater proposes to replace all existing lumber drying kilns with four new double-track kilns that are more efficient and will increase the facility's capacity to process kiln-dried dimensional lumber from the existing kilns capacity of 237,628,000 bf/yr to a requested capacity of 351,009,000 bf/yr.

The replacement of the kilns creates an increase in potential emissions of VOCs, PM_{10}, TAPs, and HAPs. The four proposed kilns are not exemptable under IDAPA 58.01.01.220 because potential emissions of VOCs from the new kilns exceeds 100 T/yr.

IDAPA 58.01.01.205 .... Permit Requirements for New Major Facilities or Major Modifications in Attainment or Nonattainment Areas

IDAPA 58.01.01.205 incorporates the federal PSD program in the state New Source Review Rules. Emissions associated with this project were estimated to establish the facility's potential to emit to demonstrate that the Clearwater Wood Products facility is an existing non-major source for PSD at the time the PTC application was submitted. Potlatch Clearwater is not a designated facility.

PTE for the existing kilns was established by Potlatch for the wood species the facility intends to process. These species include hemlock, firs (which include white and Douglas fir), and cedar. The permittee's estimated potential emissions of VOCs from the existing kiln vents to be 72.5 T/yr. The existing facility's PTE for VOCs was estimated to be approximately 85 T/yr.

PTE values for the greenhouse generator engine and fire water pump engines were estimated by the permittee using 8,760 hours per year of operation as a worst-case assumption. Table 5.5 lists the existing facility's PTE prior to completion of the kiln replacement project.

Table 5.5 EXISTING FACILITY EMISSION INVENTORY

Emission Unit/Source	PM[a]	PM_{10}[b]	VOCs	CO	NO_x	SO_2
	(T/yr)[c]	(T/yr)[c]	(T/yr)[c]	(T/yr)[c]	(T/yr)[c]	(T/yr)[c]
Kiln Vents, 32 Existing Kilns, KV-1	6.06	6.06	72.5			
Cyclone CY-1	0.09	0.09				
Cyclone, CY-2	0.02	0.02				
Cyclone, CY-3	0.04	0.04				
Cyclone, CY-4	0.23	0.23				
Cyclone, CY-6	0.14	0.14				
Cyclone, CY-18	0.01	0.01				
Cyclone, CY-25	0.43	0.43				
Cyclone, CY-26	0.02	0.02				
Cyclone, CY-27A	0.05	0.05				
Cyclone, CY-27B	0.05	0.05				
Surfacing Baghouse, BH-1	4.06	4.06				
Surfacing Baghouse, BH-2	4.28	4.28				
Surfacing Baghouse, BH-3	4.62	4.62				
Profile Baghouse, BH-4	5.07	5.07				
Profile Baghouse, BH-5	4.84	4.84				
Profile Baghouse, BH-6	3.94	3.94				
Profile Baghouse, BH-7	3.72	3.72				
Edge and Finger Joint Gluing, GL-1			3.55			
IC Engines, Firewater Pumps, IC-1, IC-2, IC-3, IC-4, IC-5 Aggregated Emissions	6.55	6.55	1.35	3.66	17.00	1.12
IC Engine, Greenhouse Generator, IC-5	1.21	1.21	7.36	6.11	92.30	6.11
Facility-wide totals (T/yr)	**45.43**	**45.43**	**84.76**	**9.77**	**109.30**	**7.23**

Potential emissions of each of the regulated air pollutants are below 250 T/yr, which establishes this facility as an existing non-major source with regard to PSD regulations. A determination of whether the net emissions increase associated with this modification creates a significant emissions increase as defined by 40 CFR 52.21(b)(40) is not required because Potlatch Clearwater is an existing non-major facility.

Post-Modification PTE for VOCs

The proposed kiln replacement project requests that the permittee be allowed to operate the existing Moore and LSI kilns concurrently with the new Wellons kilns during a shakedown period. The throughput of green lumber processed by all kilns was requested to be limited to 351,009,000 bf/yr during this period of concurrent operation. The post-modification facility-wide PTE of VOCs uses the same assumptions and calculations that the permittee used to estimate the existing facility's PTE of VOCs. Emissions of VOCs are effectively limited to below 250 T/yr with the limitation on annual throughput and a restriction on certain wood species that are high emitters of VOCs.

IDAPA 58.01.01.210............................. Demonstration of Preconstruction Compliance with Toxic Standards

Emissions of five TAPs were expected to increase as a result of the modification. The permittee quantified TAPs emissions using emission factors based on source testing results for lumber drying kilns. Emission factors were obtained from accepted published emission factors from western state environmental regulatory agencies or from documentation used by the EPA in analyzing HAP emissions for promulgating the Plywood and Composite Wood Products NESHAP standard.

The permittee demonstrated compliance with the TAPs Rules by netting emissions of TAPs in accordance with IDAPA 58.01.01.210.09 to determine if the emissions increase exceeded the screening emission rate limits specified in IDAPA 58.01.01.585 and 586. In determining the net emissions increase of TAPs emissions, as defined by IDAPA 58.01.01.007.06, the actual emissions, as defined by IDAPA 58.01.01.006.03, were based on production rates and wood species processed in calendar years 2003 and 2004. The emissions from 2003 and 2004 were averaged to establish actual emissions. The average actual emissions were subtracted from the requested future potential emissions of the drying kilns. The permittee performed an ambient air quality dispersion analysis for those pollutants with a predicted emissions increase that exceeded the screening emission rate limit.

Emissions of acetaldehyde and formaldehyde exceeded the screening emission rate limit for each pollutant. The permittee conducted ambient impact modeling for these pollutants to demonstrate that the emissions increases would not exceed each AACC increment. Future potential acetaldehyde emissions were modeled from the proposed kilns as a worst-case approach. This is considered a controlled emission rate and controlled ambient impact TAPs compliance demonstration per IDAPA 58.01.01.210.08. The lumber throughput is limited to the requested level of production. An acetaldehyde emission limit is required by IDAPA 58.01.01.210.08.c.

Actual average emissions of formaldehyde from the existing drying kilns were modeled as negative emissions and future potential formaldehyde emissions were modeled as positive emissions. The resulting predicted ambient impact was used to establish compliance with the AACC increment. This approach applied the net ambient concentration compliance demonstration per IDAPA 58.01.01.210.10. A formaldehyde emission limit is required by IDAPA 58.01.01.210.10.d.

IDAPA 58.01.01.213.............................. Pre-Permit Construction

IDAPA 58.01.01.213.01....................... Pre-Permit Construction Eligibility

The Potlatch Clearwater facility is an existing non-major source. The proposed modification is a non-major modification.

IDAPA 58.01.01.213.01.a

The permittee submitted a PTC application meeting the requirements of IDAPA 58.01.01.202.01.a, 202.02, and 202.03.

IDAPA 58.01.01.213.b.

The permittee and their consultant held a conference call with DEQ prior to submitting the PTC application.

IDAPA 58.01.01.213.c

The permittee submitted the documentation specified in IDAPA 58.01.01.213.c, including a copy of the public notice and an ambient impact demonstration conducted in accordance with a DEQ-approved protocol.

IDAPA 58.01.01.214.............................. Demonstration of Preconstruction Compliance for New and Reconstructed Major Sources of Hazardous Air Pollutants

IDAPA 58.01.01.214.03 requires that owners or operators of major sources of HAPs that are subject to an applicable promulgated MACT standard comply with that MACT standard.

40 CFR 63.2231(a) and (b) establish applicability requirements for this NESHAP standard, and read:

(a) You own or operate a PCWP manufacturing facility. A PCWP manufacturing facility is a facility that manufactures plywood and/or composite wood products by bonding wood material (fibers, particles, strands, veneers, etc.) or agricultural fiber, generally with resin under heat and pressure, to form a structural panel or engineered wood product. Plywood and composite wood products manufacturing facilities also include facilities that manufacture dry veneer and lumber kilns located at any facility. Plywood and composite wood products include, but are not limited to, plywood, veneer, particleboard, oriented strandboard, hardboard, fiberboard, medium density fiberboard, laminated strand lumber, laminated veneer lumber, wood I-joists, kiln-dried lumber, and glue-laminated beams.

(b) The PCWP manufacturing facility is located at a major source of HAP emissions. A major source of HAP emissions is any stationary source or group of stationary sources within a contiguous area and under common control that emits or has the potential to emit any single HAP at a rate of 9.07 megagrams (10 tons) or more per year or any combination of HAP at a rate of 22.68 megagrams (25 tons) or more per year.

Potlatch Clearwater manufactures kiln-dried lumber and is an existing major source of HAPs emissions, for methanol. The existing and future aggregated HAPs emissions potential to emit are below 25 T/yr, based on the information contained in the PTC application. If additional wood species are processed in the future the HAPs PTE values may be affected depending on the emissions factor data available.

EPA published the MACT requirements for lumber drying kilns in the final rule's *Summary of Responses To Major Comments and Changes to the Plywood and Composite Wood Products NESHAP*. EPA stated:

Because the MACT floor determination for lumber kilns is no emission reduction (as explained in the proposal preamble), there will not be a significant monitoring, recordkeeping, and reporting burden for facilities with only non-colocated lumber kilns.

Only those facilities that are major sources of HAP emissions are subject to the final PCWP NESHAP. Facilities with non-colocated lumber kilns that are classified as major sources of HAP must submit an initial notification form required by the final PCWP NESHAP and the Part 1 ''MACT Hammer'' application required by section 112(j) of the CAA.

40 CFR 63.2232 What parts of my plant does this subpart cover?

(a) This subpart applies to each new, reconstructed, or existing affected source at a PCWP manufacturing facility.

(b) The affected source includes lumber kilns at PCWP manufacturing facilities and at any other kind of facility.

(c) In affected source is a new affected source if you commenced construction of the affected source after January 9, 2003, and you meet the applicability criteria at the time you commenced construction.

Potlatch Clearwater's LSI and Moore masonry kilns are existing affected facilities. Upon construction of the four proposed Wellons kilns, those kilns will be a new affected facility.

40 CFR 63.2233 When do I have to comply with this subpart?

(a) If you have a new or reconstructed affected source, you must comply with this subpart according to paragraph (a)(1) or (2) of this section, whichever is applicable.

(1) If the initial startup of your affected source is before September 28, 2004, then you must comply with the compliance options, operating requirements, and work practice requirements for new and reconstructed sources in this subpart no later than September 28, 2004.

(2) If the initial startup of your affected source is after September 28, 2004, then you must comply with the compliance options, operating requirements, and work practice requirements for new and reconstructed sources in this subpart upon initial startup of your affected source.

Compliance with the applicable NESHAP requirements for the proposed Wellons kilns will be required upon startup.

Notifications, Reports, and Records

***40 CFR 63.2280** What notifications must I submit and when?*

(b) You must submit an Initial Notification no later than 120 calendar days after September 28, 2004, or after initial startup, whichever is later, as specified in 40 CFR 63.9(b)(2).

40 CFR 63.9 Notification requirements.

(b) Initial notifications.

2) The owner or operator of an affected source that has an initial startup before the effective date of a relevant standard under this part shall notify the Administrator in writing that the source is subject to the relevant standard. The notification, which shall be submitted not later than 120 calendar days after the effective date of the relevant standard (or within 120 calendar days after the source becomes subject to the relevant standard), shall provide the following information:

(i) The name and address of the owner or operator;

(ii) The address (i.e., physical location) of the affected source;

(iii) An identification of the relevant standard, or other requirement, that is the basis of the notification and the source's compliance date;

(iv) A brief description of the nature, size, design, and method of operation of the source and an identification of the types of emission points within the affected source subject to the relevant standard and types of hazardous air pollutants emitted; and

(v) A statement of whether the affected source is a major source or an area source.

40 CFR 63—Subpart DDDD does not contain any emissions-based control requirements for the lumber drying kilns at Potlatch Clearwater. The only requirement for the permittee to comply with is the submittal of initial notification of being subject to 40 CFR 63—Subpart DDDD as a major HAPs source.

IDAPA 58.01.01.300............................... Procedures and Requirements for Tier I Operating Permits

Potlatch Clearwater is a Tier I major facility as defined by IDAPA 58.01.01.008. Emissions of methanol, a HAP, are greater than 10 T/yr. Upon issuance of this PTC, potential emissions of VOCs will be 217 T/yr. The terms and conditions of this PTC do not contravene any provision of the facility's Tier I operating permit.

The permittee is required to include all applicable requirements of this PTC in the Tier I operating permit application when the Tier I permit is renewed, as specified by IDAPA 58.01.01.209.05a.iv. Information requirements for the Tier I permit application are specified by IDAPA 58.01.01.314.

The annual throughput limitation, wood species prohibition, and all monitoring, recordkeeping and reporting requirements associated with the throughput limitation and wood species processing requirements are considered applicable requirements under the Tier I permitting program.

TAPs emission limits do not qualify as applicable requirements for Tier I permitting, as defined by IDAPA 58.01.01.008.03.b. TAPs emission limits are not required to be included in the facility's Tier I operating permit.

Initial notification requirement established under 40 CFR 63—Subpart DDDD is an applicable requirement under the Tier I permitting program.

Any of the applicable requirements generated by the issuance of this PTC must be incorporated in the facility's Tier I permit renewal.

5.5 Permit Conditions Review

This permit action consists of an entirely new PTC issued to the Potlatch Clearwater Wood Products facility for the kiln replacement project.

Permit Condition 2.3 – Opacity Limit

2.3 Opacity Limit

Emissions from the drying kilns, or any other stack, vent, or functionally equivalent opening associated with the drying kilns, shall not exceed 20% opacity for a period or periods aggregating more than three minutes in any 60-minute period as required by IDAPA 58.01.01.625. Opacity shall be determined by the procedures contained in IDAPA 58.01.01.625, unless otherwise specified.

Permit Condition 2.4 contains the state of Idaho opacity standard for point sources. No specific monitoring or recordkeeping is required in the PTC to demonstrate compliance with the opacity limit, because opacity emissions from the lumber drying kilns are expected negligible.

Permit Condition 2.4—TAPs Emission Limits

2.4 Toxic Air Pollutant Emission Limits

2.4.1 Acetaldehyde

Emissions of acetaldehyde shall not exceed 2,738 pounds per any consecutive 12-month period.

2.4.2 Formaldehyde

Emissions of formaldehyde shall not exceed 983 pounds per any consecutive 12-month period.

The acetaldehyde emission limit was included in the permit because DEQ the application's ambient impact demonstration is based on a controlled ambient impact.

Permit Condition 2.5– Lumber Throughput Limitation

2.5 Throughput Limits

The throughput of lumber for the kilns shall not exceed 351,009 thousand board feet (Mbf) of all wood species during any consecutive 12-month period.

Concurrent operation of the 32 existing and four proposed drying kilns have a throughput limitation of 351,009,000 bf/yr of lumber. After the existing kilns have been decommissioned, the four new Wellons drying kilns must comply with the same throughput limitation. Potential emissions of TAPs, HAPs, PM_{10}, and VOCs are limited by the throughput limitation.

Permit Condition 2.6--Prohibited Wood Species

2.6 Prohibited Wood Species

The following wood species shall not be processed in the lumber drying kilns:

- *White pine,*
- *Ponderosa pine,*
- *Southern yellow pine,*
- *Red pine,*
- *Lodgepole pine, and*
- *Sugar pine.*

This is an operating requirement. These wood species have been prohibited to be processed in the drying kilns to limit potential VOCs emissions. Lodgepole pine is prohibited to limit both VOCs and formaldehyde emissions.

Permit Condition 2.7—Concurrent Operation of the Kilns

2.7 Concurrent Operation of New and Existing Kilns

The duration of concurrent operation of the 32 existing Moore and LSI kilns and the four new Wellons kilns shall not exceed 180 days. The period of allowable concurrent operation commences on the date of initial startup of one or more of the Wellons kilns and terminates after 180 consecutive days following initial startup.

This permit condition establishes the duration that the existing kilns and the new kilns can operate concurrently. The duration of this period was established from the permittee's March 18, 2005 PTC application.

Permit Condition 2.8 – Compliance Demonstration for Emissions Limits on VOCs and TAPs, and Throughput Limit

2.8 Throughput Monitoring and Recordkeeping

Each month, the permittee shall monitor and record the throughput and wood species of lumber for the drying kilns in units of thousand board feet (Mbf) for that month and for the most recent consecutive 12-month period.

A compilation of the most recent two years of records shall be kept on site and shall be made available to DEQ representatives upon request.

The permittee is required to monitor and record the throughput of lumber processed in the drying kilns on bases of monthly and for every consecutive 12-month period. The units used to track throughput are on a basis of thousand board feet, in order to establish compliance with the throughput limitation in Permit Condition 2.5.

The permittee is required to monitor and record the species of wood dried in the kilns to establish compliance with Permit Condition 2.6, which prohibits the drying of certain species of wood.

Permit Condition 2.9—Initial Notification of NESHAP Applicability

2.9 Plywood and Composite Wood Products NESHAP Initial Applicability Reporting Requirement

The permittee shall submit initial notification of applicability to 40 CFR 63—Subpart DDDD to DEQ and EPA Region 10 in accordance with the following:

<u>40 CFR 63—Subpart DDDD Initial Notification</u>

§ 63.9(b) Initial notifications.

2) The owner or operator of an affected source that has an initial startup before the effective date of a relevant standard under this part shall notify the Administrator in writing that the source is subject to the relevant standard. The notification, which shall be submitted not later than 120 calendar days after the effective date of the relevant standard (or within 120 calendar days after the source becomes subject to the relevant standard), shall provide the following information:

(i) The name and address of the owner or operator;

(ii) The address (i.e., physical location) of the affected source;

(iii) An identification of the relevant standard, or other requirement, that is the basis of the notification and the source's compliance date;

(iv) A brief description of the nature, size, design, and method of operation of the source and an identification of the types of emission points within the affected source subject to the relevant standard and types of hazardous air pollutants emitted; and

(v) A statement of whether the affected source is a major source or an area source.

Potlatch Clearwater currently is a major source of HAPs and will remain a major source of HAPs upon issuance of this PTC. MACT promulgation for lumber drying kilns did not include any emission reduction standards. The only requirement listed in 40 CFR 63—Subpart DDDD was an initial notification under 40 CFR 63.9(b).

6. PERMIT FEES

Table 5.6 contains the emission increases at the Potlatch Clearwater facility that are subject to PTC processing fee review.

Table 5.6 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	0.0	0	0.0
SO_2	0.0	0	0.0
CO	0.0	0	0.0
PM_{10}	8.4	0	8.4
VOC	67.2	0	67.2
TAPS/HAPS	11.4	0	11.4
Total:	87.0	0	**87.0**
Fee Due	**$ 5,000.00**		

Potlatch Clearwater submitted a payment of $2,500.00 on March 18, 2005, to be applied to the 15-day Pre-Permit Construction approval application. $1,000.00 was applied to the application fee, and $1,500.00 of this fee submittal will be applied toward the PTC processing fee for the kiln replacement project. A balance of $3,500.00 is required to be submitted as a processing fee prior to issuing the PTC for this project. Payment of the $3,500 processing fee was received by DEQ on August 9, 2005.

Potlatch Clearwater is current with Tier 1 operating permit fee requirements.

7. PERMIT REVIEW

7.1 Regional Review of Draft Permit

A draft PTC package was provided to the Lewiston Regional Office for review on June 7, 2005. On June 13, 2005, the Lewiston Regional Office responded that they did not have any comments.

7.2 Facility Review of Draft Permit

The permittee has not requested to review a facility draft PTC and statement of basis.

7.3 Public Comment

An opportunity for public comment period on the PTC application was provided from February 25, 2005 to March 28, 2005, in accordance with IDAPA 58.01.01.209.01.c. During this time, there were not comments on the application. On March 2, 2005, DEQ's Lewiston Regional Office received a request for a public comment period. A 30-day public comment period was held from June 29, 2005 to July 29, 2005. There was one public comment submittal received. DEQ's responses to the public comment submittal are contained in Appendix E of this memorandum.

8. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommend that the Potlatch Corporation, Clearwater Wood Products be issued a final PTC No. P-050200 for the four new Wellons lumber drying kilns. A public comment period was held from June 29 to July 29, 2005, and the project does not involve PSD requirements.

DAM/sd Permit No. P-050200

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Appendix A

AIRS Information

P-050200

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: Potlatch Corporation, Clearwater Wood Products
Facility Location: Lewiston, Idaho
AIRS Number: 069-00003

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	B							U
NO_x	A							U
CO	B							U
PM_{10}	B							U
PT (Particulate)	B							
VOC	A						A	U (ozone)
THAP (Total HAPs)	A Methanol				DDDD		A	
			APPLICABLE SUBPART					
					A			

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

Appendix B

Emissions Inventory

P-050200

Table 2. Existing Facility Potential to Emit for Criteria Pollutants

Source/Pollutant	1999 Throughput	PTE Throughput	Units	Emission Factor	Units	Yearly Emiss. (ton/yr)	See Note
BAGHOUSES AND CYCLONES							
CY-1, Specialties Gang Rip Cyc./PM10	153	240	Tons/yr	0.78	lb/ton	0.09	1
CY-2, Specialties Gang Rip Cyc./PM10	153	240	Tons/yr	0.16	lb/ton	0.02	1
CY-3, Specialties Grecon/PM10	334	524	Tons/yr	0.16	lb/ton	0.04	1
CY-4, Specialties Nu-Loc/PM10	572	897	Tons/yr	0.52	lb/ton	0.23	1
CY-6, Specialties, CY-1 to CY-4/PM10	1,115	1,748	Tons/yr	0.16	lb/ton	0.14	1
CY-18, Surfacing, #4 Splitter/PM10	23	36	Tons/yr	0.60	lb/ton	0.01	1
CY-25, Surfac., Chipper, Chips/PM10	8,995	14,099	Tons/yr	0.06	lb/ton	0.43	1
CY-26, Sawmill, All Machine Ctrs/PM10	128	201	Tons/yr	0.16	lb/ton	0.02	1 and 2
CY-27A, Sawmill, All Machine Ctrs/PM10	81	127	Tons/yr	0.78	lb/ton	0.05	1 and 2
CY-27B, Sawmill, All Machine Ctrs/PM10	81	127	Tons/yr	0.78	lb/ton	0.05	1
BH-1, Surfacing/PM10		8760	hr/yr	0.926	lb/hr	4.06	3
BH-2, Surfacing/PM10		8760	hr/yr	0.977	lb/hr	4.28	3
BH-3, Surfacing/PM10		8760	hr/yr	1.054	lb/hr	4.62	3
BH-4, Profile/PM10		8760	hr/yr	1.157	lb/hr	5.07	3
BH-5, Profile/PM10		8760	hr/yr	1.106	lb/hr	4.84	3
BH-6, Profile/PM10		8760	hr/yr	0.900	lb/hr	3.94	3
BH-7, Profile/PM10		8760	hr/yr	0.849	lb/hr	3.72	3
GL-1, VOC's from Lewiston Cedar Products Edge & FJ glue		231,382	lb/yr	0.0307	lb/lb glue	3.55	4
KV-1, Kiln Vents							
PM10		237,628	MBF/yr	0.051	lb/MBF	6.06	5
VOCs		237,628	MBF/yr	0.61	lb/MBF	72.5	5
Engine IC-5, 125 hp Greenhouse Generator							
PM10		8,760	hr/yr	0.28	lb/hr oper.	1.21	6
SOx		8,760	hr/yr	0.26	lb/hr oper.	1.12	7
CO		8,760	hr/yr	0.84	lb/hr oper.	3.66	7

Source/Pollutant	1999 Throughput	PTE Throughput	Units	Emission Factor	Units	Yearly Emiss. (ton/yr)	See Note
NOx		8,760	hr/yr	3.88	lb/hr oper.	17.0	7
VOCs		8,760	hr/yr	0.31	lb/hr oper.	1.35	8
Engines IC-1 to IC-4, 170 hp Fire Pump Engines (Total for all four)							
PM10		8,760	hr/yr	0.37	lb/hr oper.	6.55	6
SOx		8,760	hr/yr	0.35	lb/hr oper.	6.11	7
CO		8,760	hr/yr	1.14	lb/hr oper.	19.9	7
NOx		8,760	hr/yr	5.27	lb/hr oper.	92.3	7
VOCs		8,760	hr/yr	0.42	lb/hr oper.	7.36	8
					Total PM-10	**45 ton/yr**	
					Total SOx	**7 ton/yr**	
					Total CO	**24 ton/yr**	
					Total NOx	**109 ton/yr**	
					Total VOCs	**85 ton/yr**	

(1) PTE throughput is calculated by multiplying 1999 data by the ratio of current potential production to production for 1999, which was 151,607 MBF.

(2) Hourly rates estimated per PTC Applicability Determination P-940222, May, 1995. Calculation: {[(lb/hr)(hr/yr)/2,000 lb/ton](emission factor)} / 2,000 lb/ton.

(3) Manufacturer's guarantee (gr/cf × fan output (cfm) × lb/gr × 60 min/hr).

(4) Information from glue manufacturer (MSDS).

(5) Assumes 100% Hemlock (PM10) and 100% Douglas Fir (VOCs), using emission factors from Oregon Department of Environmental Quality Emission Factors for Wood Products (AQ-EF02, June 26, 2003). Note: White Fir's VOC emission factor is 0.53 lb/MBF.

(6) AP-42 Table 3.3-1 (10/96): Diesel Fuel (assumed PM = PM-10).

(7) AP-42 Table 3.3-1 (10/96): Diesel Fuel.

(8) AP-42 Table 3.3-1 (10/96): Diesel Fuel (exhaust TOC).

Table 3. Existing Facility Potential to Emit for HAPs

Pollutant	Emission Factor (lb/MBF)	Potential Production (MBF/year)	Potential Emissions (tons/year)
Acetaldehyde	0.0078	237,628	0.93
Formaldehyde	0.0028		0.33
Methanol	0.12		14.26
Methyl ethyl ketone	0.0013		0.15
Phenol	0.004		0.48
		Total HAPs	16.15

Formaldehyde and methanol emission factors from OSU Forest Products Study, September 2000. Endorsed by NCASI and ODEQ.

Phenol emission factor is provided by ORCAA, and is based on Cowlitz Stud Co. Study.

Acetaldehyde and MEK emission factors from Table D4, June 9, 2000 letter to Mary Tom Kissell (EPA) from Katie Hanks, MRI.

Potential production is the sum of the maximum possible masonry kiln and LSI kiln production.

Table 4. Potential Kiln Production Rates

		hours/charge	bf/kiln/charge	MBF/kiln/hr	MBF/kiln/yr	total MBF/yr
Masonry Kilns	Hemlock	100	70,656	0.71	6,189	191,873
	Fir/Larch	80	62,208	0.78	6,812	211,165
	Cedar	72	50,688	0.70	6,167	191,178
LSI Kiln	Hemlock	48	145,000	3.02	26,463	26,463
	Fir/Larch	40	145,000	3.63	31,755	31,755
	Cedar	36	96,500	2.68	23,482	23,482
New kilns	Hemlock	31	230,400	7.43	65,107	260,426
	Fir/Larch	23	230,400	10.02	87,752	351,009
	Cedar	21	161,280	7.68	67,277	269,107

Table 5. Actual Kiln Production Rates

	2003	2004	Average Production
Hemlock	74.40%	68.10%	130,980 MBF
Fir/Larch	0%	8.80%	8,140 MBF
Cedar	25.60%	23.10%	44,761 MBF
Total MBF	182,761	185,000	183,881

Table 6. Past Actual Kiln Emissions

	Average Production	lb PM/MBF	tons PM10/year	lb PM10/hr	lb VOC/MBF	tons VOC/year
Hemlock	130,980 MBF	0.051	3.34 ok		0.53	34.7
Fir/Larch	8,140 MBF	0.02	0.08 ok		0.61	2.5
Cedar	44,761 MBF	0.04	0.90 ok		0.12	2.7
Total	183,881 MBF		4.32 ok			39.9
Per masonry kiln[1]			0.123 ok	0.028 ok		1.13
LSI kiln[1]			0.518 ok	0.118 ok		4.83
1) Emission split between the masonry and LSI kiln based on relative kiln drying capacities.						

Table 7. Future Potential Kiln Emissions

	Potential Production	lb PM/MBF	tons PM10/year	lb PM10/hr	lb VOC/MBF	tons VOC/year
Hemlock	260,426	0.051	6.64		0.53	69.0
Fir/Larch	351,009	0.02	3.51		0.61	107.1
Cedar	269,107	0.04	5.38		0.12	16.1
Maximum			6.64	1.52		107.1
Per new kiln			1.66	0.38		26.8

Table 8. Criteria Pollutant Emissions Increases Due to the Kiln Replacement

Pollutant	Emission Change by Source (TPY)		Net Emission Increase (TPY)
	Old Kilns (Actual)	New Kilns (Potential)	
PM10	-4.3	6.6	2.3
VOC	-39.9	107.1	67.2

Table 9. Toxic Air Pollutant Kiln Emissions

Pollutant	Emission Factor	Current Actual Production	Current Actual Emissions	Future Potential Production	Future Potential Emissions		Net emissions increase	EL	Modeling required?
	(lb/MBF)	MBF/year	tons/year	MBF/year	tons/year	lb/hr	lb/hr	lb/hr	
Acetaldehyde	0.0078	183,881	0.72	351,009	1.37	0.31	0.149	0.003	Yes
Formaldehyde	0.0028		0.26		0.49	0.11	0.053	0.00051	Yes
Methanol	0.12		11.03		21.06	4.81	2.289	17.30	No
Methyl ethyl ketone	0.0013		0.12		0.23	0.05	0.025	39.30	No
Phenol	0.004		0.37		0.70	0.16	0.076	1.27	No
Total TAPs			12.49		23.85				

Formaldehyde and methanol emission factors from OSU Forest Products Study, September 2000. Endorsed by NCASI and ODEQ

Phenol emission factor is provided by ORCAA, and is based on Cowlitz Stud Co. Study.

Acetaldehyde and MEK emission factors from Table D4, June 9, 2000 letter to Mary Tom Kissell (EPA) from Katie Hanks, MRI.

Current production is the sum of the masonry kilns production and the LSI kiln production.

Table 10. Cyclone and Baghouse Emissions Increases due to Kiln Replacement

			Current Actual Production		Future Potential Production			
Annualized Emissions								
Source	1999 Throughput (TPY)	Emission Factor	2003-2004 Average Throughput	Actual Emissions (TPY)	Future Potential Throughput	PTE Emissions (TPY)	Emissions Increase (TPY)	See Note
CY-18, Surfacing, #4 Splitter	23	0.60 lb/ton	28 TPY	0.008	53 TPY	0.016	0.008	1
CY-25, Surfac., Chipper, Chips	8,995	0.06 lb/ton	10,910 TPY	0.335	20,826 TPY	0.640	0.305	1
CY-26, Sawmill, All Machine Ctrs	128	0.16 lb/ton	155 TPY	0.013	296 TPY	0.024	0.012	1, 2
CY-27A, Sawmill, All Machine Ctrs	81	0.78 lb/ton	98 TPY	0.038	188 TPY	0.073	0.035	1, 2
CY-27B, Sawmill, All Machine Ctrs	81	0.78 lb/ton	98 TPY	0.038	188 TPY	0.073	0.035	1
BH-1, Surfacing		0.926 lb/hr	4280 hr/yr	1.981	8170 hr/yr	3.782	1.801	3
BH-2, Surfacing		0.977 lb/hr	4280 hr/yr	2.091	8170 hr/yr	3.992	1.901	3
BH-3, Surfacing		1.054 lb/hr	4280 hr/yr	2.256	8170 hr/yr	4.307	2.051	3
Daily Emissions								
Source	1999 Throughput	Emission Factor	2003-2004 Average Throughput	Actual Emissions (lb/day)	Future Potential Throughput	PTE Emissions (lb/day)	Emissions Increase (lb/hr)	See Note
CY-18, Surfacing, #4 Splitter	23	0.60 lb/ton	0.007 ton/hr	0.031	0.007 ton/hr	0.094	0.00261	1
CY-25, Surfac., Chipper, Chips	8,995	0.06 lb/ton	2.549 ton/hr	1.254	2.549 ton/hr	3.762	0.105	1
CY-26, Sawmill, All Machine Ctrs	128	0.16 lb/ton	0.036 ton/hr	0.048	0.036 ton/hr	0.143	0.00398	1, 2
CY-27A, Sawmill, All Machine Ctrs	81	0.78 lb/ton	0.023 ton/hr	0.143	0.023 ton/hr	0.430	0.0119	1, 2
CY-27B, Sawmill, All Machine Ctrs	81	0.78 lb/ton	0.023 ton/hr	0.143	0.023 ton/hr	0.430	0.0119	1
BH-1, Surfacing		0.926 lb/hr	16 hr/dy	14.811	24 hr/dy	22.217	0.309	3
BH-2, Surfacing		0.977 lb/hr	16 hr/dy	15.634	24 hr/dy	23.451	0.326	3
BH-3, Surfacing		1.054 lb/hr	16 hr/dy	16.869	24 hr/dy	25.303	0.351	3

(1) Current actual (and future potential) throughput is calculated by multiplying 1999 data by the ratio of current (and future) production to production for 1999, which was 151,607 MBF.

(2) Hourly rates estimated per PTC Applicability Determination P-940222, May, 1995. Calculation: {[(lb/hr)(hr/yr)/2,000 lb/ton](emission factor)} / 2,000 lb/ton.

(3) Manufacturer-supplied emission rate (gr/cf × fan output (cfm) × lb/gr × 60 min/hr).

Table 11. Criteria Pollutant Emissions Increases due to Increased Steam Demand

Pollutant	Hourly Steam Demand Increase (MMBtu/hr)	Annual Steam Demand Increase (MMBtu/yr)	Emission Rate (lb/MMBtu)	Source Test Date	Hourly Emissions Increase (lb/hr)	Annual Emissions Increase (ton/yr)
CO	112.8	453,553	0.75	June 2001	84.6	170.1
NOx			0.14	Average of 2004 CEMs Data	15.8	31.7
PM10			0.0038	September 2003	0.43	0.86
SOx			0.0001	June 2001	0.011	0.023
VOCs			0.034	NCASI TB 884 Pg. 39	3.83	7.71

Table 12. Cyclone and Baghouse Emission Rates for Facility-Wide Modeling

			Daily Emissions		Annualized Emissions		
Source	1999 Throughput (TPY)	Emission Factor	Future Potential Throughput	PTE Emissions (lb/hr)	Future Potential Throughput	PTE Emissions (TPY)	See Note
CY-1, Specialties Gang Rip Cyc.	153	0.78 lb/ton	0.089 ton/hr	0.069	354 ton/yr	0.138	1
CY-2, Specialties Gang Rip Cyc.	153	0.16 lb/ton	0.089 ton/hr	0.015	354 ton/yr	0.029	1
CY-3, Specialties GRECON	334	0.16 lb/ton	0.195 ton/hr	0.032	773 ton/yr	0.063	1
CY-4, Specialties NULOC	572	0.52 lb/ton	0.334 ton/hr	0.174	1,324 ton/yr	0.346	1
CY-6, Specialties, CY-1, CY-2, CY-3, CY-4	1,115	0.16 lb/ton	0.650 ton/hr	0.107	2,582 ton/yr	0.212	1
CY-18, Surfacing, #4 Splitter	23	0.60 lb/ton	0.007 ton/hr	0.004	53 ton/yr	0.016	1
CY-25, Surfac., Chipper, Chips	8,995	0.06 lb/ton	2.549 ton/hr	0.157	20,826 ton/yr	0.640	1
CY-26, Sawmill, All Machine Ctrs	128	0.16 lb/ton	0.036 ton/hr	0.006	296 ton/yr	0.024	1, 2
CY-27A, Sawmill, All Machine Ctrs	81	0.78 lb/ton	0.023 ton/hr	0.018	188 ton/yr	0.073	1, 2
CY-27B, Sawmill, All Machine Ctrs	81	0.78 lb/ton	0.023 ton/hr	0.018	188 ton/yr	0.073	1
BH-1, Surfacing		0.926 lb/hr	24 hr/dy	0.926	8760 hr/yr	4.055	3
BH-2, Surfacing		0.977 lb/hr	24 hr/dy	0.977	8760 hr/yr	4.280	3
BH-3, Surfacing		1.054 lb/hr	24 hr/dy	1.054	8760 hr/yr	4.618	3
BH-4, Profile		1.157 lb/hr	24 hr/dy	1.157	8760 hr/yr	5.068	3
BH-5, Profile		1.106 lb/hr	24 hr/dy	1.106	8760 hr/yr	4.843	3
BH-6, Profile		0.900 lb/hr	24 hr/dy	0.900	8760 hr/yr	3.942	3
BH-7, Profile		0.849 lb/hr	24 hr/dy	0.849	8760 hr/yr	3.717	3

(1) PTE throughput is calculated by multiplying 1999 data by the ratio of current production to production for 1999, which was 151,607 MBF.

(2) Hourly rates estimated per PTC Applicability Determination P-940222, May, 1995. Calculation: {[(lb/hr)(hr/yr)/2,000 lb/ton](emission factor)} / 2,000 lb/ton.

(3) Manufacturer-supplied emission rate (gr/cf × fan output (cfm) × lb/gr × 60 min/hr).

Appendix C

Modeling Review

P-050200

MEMORANDUM

DATE: June 17, 2005

TO: Darrin Mehr, Air Quality Analyst, Air Program

FROM: Kevin Schilling, Modeling Coordinator – Stationary Sources, Air Program

PROJECT NUMBER: P-050200

SUBJECT: Modeling Review for the Potlatch Clearwater Wood Products Permit to Construct Application for replacing existing dry kilns at their Lewiston, Idaho facility.

1.0 SUMMARY

Potlatch Clearwater Wood Products (Clearwater) submitted an application to modify their sawmill located near Lewiston, Idaho. Air quality analyses involving atmospheric dispersion modeling of emissions associated with the proposed modification were submitted in support of a Permit to Construct (PTC) application to demonstrate that the stationary source would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02). Geomatrix Consultants (Geomatrix), Clearwater's consultant, conducted the ambient air quality analyses.

A technical review of the submitted air quality analyses was conduced by DEQ. The submitted modeling analyses in combination with DEQ's staff analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed either a) that predicted pollutant concentrations from emissions associated with the proposed project were below significant contribution levels (SCLs); or b) that predicted pollutant concentrations from facility-wide emissions, when appropriately combined with background concentrations, were below applicable air quality standards at receptor locations where the proposed project would cause a concentration impact exceeding SCLs. Impacts of Toxic Air Pollutants (TAPs) were all below allowable increments of IDAPA 58.01.01.585 and 586. DEQ also conducted independent screening-level analyses to assess the potential for facility-wide emissions to contribute to an exceedance of ambient air quality standards at all ambient air locations. Table 1 presents key assumptions and results that should be considered in the development of the permit.

2.0 BACKGROUND INFORMATION

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance.

Table 1. KEY ASSUMPTIONS USED IN MODELING ANALYSES

Criteria/Assumption/Result	Explanation/Consideration
Modeled concentrations from the proposed modification and other associated changes (impact of new kilns minus impact of existing kilns to be removed, and the emission increases associated with debottlenecked sources) were above significant contribution levels at some receptors for 24-hour and annual PM_{10} averaging periods.	Facility-wide modeling was required for issuance of this permit. Concentrations from facility-wide emissions were only assessed at those receptors where the emissions from the proposed project were predicted to have an impact exceeding SCLs.
Modeled concentrations from new kilns only were above significant contribution levels but well below air quality standards.	Since the existing kilns were not previously modeled to evaluate compliance with NAAQS, DEQ determined it would be appropriate to check that emissions from the new kilns by themselves would not cause an exceedance of NAAQS.
Acetaldehyde and net Formaldehyde impacts were well below AACCs.	Emission limits for formaldehyde should be included in the permit since netting was necessary to demonstrate compliance with the formaldehyde AACC, as per IDAPA 58.01.01.210.10.
Facility-wide modeling was only conducted for a very limited number of receptors (those significantly impacted by emissions from the kiln replacement project).	Facility-wide modeling, using a comprehensive receptor grid, should be conducted for the Potlatch facilities to evaluate NAAQS compliance at all ambient air locations. Although facility-wide NAAQS compliance concerns, outside the scope of this permitting action, were identified as a result of DEQ's review/analysis of materials submitted with this application, a refined, comprehensive facility-wide NAAQS assessment should be conducted separately from this PTC action.

2.1.1 Area Classification

The Clearwater facility is located in Nez Perce County, designated as an attainment or unclassifiable area for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), lead (Pb), ozone (O_3), and particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}). There are no Class I areas within 10 kilometers of the facility.

2.1.2 Significant and Full Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources of the proposed modification and associated emission increases and decreases exceed the significant contribution levels (SCLs) of IDAPA 58.01.01.006.91, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location and the area of significant impact. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 2. It is only necessary to demonstrate facility-wide NAAQS compliance at those specific receptors where the significant impact analysis indicates impacts exceed SCLs. Table 2 also lists SCLs and specifies the modeled value that must be used for comparison to the NAAQS.

Table 2. APPLICABLE REGULATORY LIMITS

Pollutant	Averaging Period	Significant Contribution Levels[a] ($\mu g/m^3$)[b]	Regulatory Limit[c] ($\mu g/m^3$)	Modeled Value Used[d]
PM_{10}[e]	Annual	1.0	50[f]	Maximum 1st highest[g]
	24-hour	5.0	150[h]	Maximum 6th highest[i]
Carbon monoxide (CO)	8-hour	500	10,000[j]	Maximum 2nd highest[g]
	1-hour	2,000	40,000[j]	Maximum 2nd highest[g]
Sulfur Dioxide (SO_2)	Annual	1.0	80[f]	Maximum 1st highest[g]
	24-hour	5	365[j]	Maximum 2nd highest[g]
	3-hour	25	1,300[j]	Maximum 2nd highest[g]
Nitrogen Dioxide (NO_2)	Annual	1.0	100[f]	Maximum 1st highest[g]
Lead (Pb)	Quarterly	NA	1.5[h]	Maximum 1st highest[g]

a. IDAPA 58.01.01.006.91
b. Micrograms per cubic meter
c. IDAPA 58.01.01.577 for criteria pollutants
d. The maximum 1st highest modeled value is always used for significant impact analysis
e. Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
f. Never expected to be exceeded in any calendar year
g. Concentration at any modeled receptor
h. Never expected to be exceeded more than once in any calendar year
i. Concentration at any modeled receptor when using five years of meteorological data
j. Not to be exceeded more than once per year

2.1.3 <u>Toxic Air Pollutant Impact Analysis</u>

Toxic Air Pollutant (TAP) analysis requirements for PTC applications are specified in IDAPA 58.01.01.210. If the emissions increase associated with a new source or modification exceeds screening emission levels (ELs) of IDAPA 58.01.01.585 and IDAPA 58.01.01.586, then the potential ambient impact of the emissions increase must be estimated. If ambient impacts are less than applicable Acceptable Ambient Concentrations (AACs) for non-carcinogens of IDAPA 58.01.01.585 and Acceptable Ambient Concentrations for Carcinogens (AACCs) of IDAPA 58.01.01.586, then compliance with TAP requirements has been demonstrated.

2.2 *Facility Definition*

The Potlatch site consists of three separate facilities: 1) Clearwater Wood Products (Clearwater); 2) Idaho Pulp and Paper Division (IPPD); 3) Consumer Products Division (CPD). Although these are considered separate facilities, DEQ determined they would be treated primarily as a single facility with regard to several atmospheric dispersion modeling methods. Ambient air was considered to be those areas external to all three facilities – areas of the IPPD and CPD were not considered as ambient air when assessing impacts from Clearwater. Also, any facility-wide modeling requires assessing impacts of emissions from all three facilities.

2.3 *Background Concentrations*

Background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. Background concentrations used in these analyses are listed in Table 3. Monitoring data collected in Lewiston, were used for PM_{10}. When assessing impacts, it is important to consider that Clearwater, CPD, and IPPD likely have an impact on monitored values from the Lewiston-east site. Using this site for background concentrations would be overly conservative, since the impact of the existing Potlatch complex is partially accounted for in the monitored value. Therefore, monitoring data from the Lewiston-central site, located at the state office building, were used to evaluate NAAQS compliance.

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1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson, March 14, 2003.

Table 3. BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Concentration (µg/m³)[a]
PM_{10}[b]	24-hour	76[c], 68[d]
	annual	31.3[c], 24.9[d]

a. Micrograms per cubic meter
b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
c. Lewiston-east (ISP site)
d. Lewiston-central (state office building)

3.0 MODELING IMPACT ASSESSMENT

3.1 Modeling Methodology

Table 4 provides a summary of the modeling parameters used by Geomatrix in the submitted analyses.

Table 4. MODELING PARAMETERS

Parameter	Description/Values	Documentation/Additional Description
Model	AERMOD and ISCST3	AERMOD version 02222 and ISCST3 version 02035. DEQ used AERMOD version 04079 for verification analyses.
Meteorological data	Site Specific	1992-1995, 1997
Terrain	considered	Elevation data from digital elevation model (DEM) files
Building downwash	PRIME algorithm	Building dimensions obtained from modeling files submitted
Receptor grid	Grid 1	25-meter spacing along boundary
	Grid 2	100-meter spacing in a 2,000 meter by 2,000 meter grid
	Grid 3	250 meter spacing in a 10,000 meter by 10,000 meter grid
Facility location (UTM)[a]	Easting	502 kilometers
	Northing	5,141 kilometers

a. Universal Transverse Mercator

3.1.1 Modeling protocol

An email protocol was submitted to DEQ on November 3, 2004. The protocol was submitted by Bart Brashers of MFG, Inc. The air modeling group of MFG later became part of Geomatrix. Modeling was conducted in accordance with procedures discussed in the protocol.

3.1.2 Model Selection

AERMOD was proposed for the kiln replacement project primarily because the effects of elevated terrain had to be more accurately accounted for. The algorithms within ISCST3 to handle complex terrain are conservative and are considered as screening-level, typically overestimating concentrations in complex terrain by a substantial margin. Since compliance with air quality standards could not be demonstrated through the use of ISCST3, a more accurate model had to be used to estimate impacts on elevated terrain. AERMOD is considered to be more accurate in situations of elevated terrain.

AERMOD is proposed as the replacement model for ISCST3. In addition to increased accuracy for impacts in elevated terrain, it incorporates the PRIME downwash algorithm, which is superior to the existing downwash algorithms within ISCST3 and it is capable of estimating concentrations within building recirculation cavities.

DEQ has previously approved use of AERMOD for the Potlatch site, including the 2002 protocol for the Mill Viability Permit Application (an application was never submitted to DEQ) and the 2004 Package Boiler PTC application (DEQ denied the PTC because of incorrect emissions netting). This is the first permit issued to Potlatch where NAAQS compliance was based on modeling using AERMOD.

The PRIME downwash algorithm within AERMOD currently causes problems when trying to model horizontal releases where plume thermal buoyancy must be considered. The typical method (when using ISCST3) used for modeling buoyant plumes from a horizontal release is to set the stack exit velocity to 0.001 m/sec or 0.01 m/sec to negate any momentum plume rise. The stack diameter is then increased to a point where the total flow volume from the modeled stack is equal to the actual flow volume, since the buoyancy flux is a function of the total volume of stack gas released and the temperature of the gas stream. This method cannot be used with AERMOD and ISC-PRIME because downwash is a function of stack diameter in the PRIME downwash algorithm within these models. Geomatrix also indicated that AERMOD exhibited problems with ambient temperature plumes from vertical stacks.

Some of the debottlenecked sources modeled for the significant impact analyses, and many of the sources for the full impact analyses, involve either hot gases from horizontal releases or ambient temperature gases from vertical releases. Geomatrix addressed this problem by utilizing an hour-by-hour, receptor-by-receptor combination of AERMOD and ISCST3. ISCST3 was used for those sources having either a horizontal release at elevated temperatures or a vertical release at ambient temperatures.

3.1.3 Meteorological Data

A five-year meteorological database was constructed from the following data:

- Surface data from an onsite 100-meter tower (wind speed, wind direction, and temperature from 10 meters, 50 meters, and 100 meters; and solar radiation at two meters).
- Surface observations of cloud cover from the Lewiston Airport.
- Twice daily soundings from Spokane, Washington.

The meteorological data used were collected for January 1992 through December 1995, and for all of 1997. Data from 1996 were not used because EPA data recovery goals were not met.

Meteorological data were prepared for input to AERMOD using the preprocessor AERMET. These data were prepared by CH2M-Hill, Potlatch's consultant used for preparing the Mill Viability Permit Application modeling protocol. Several site-specific geophysical surface characteristics must be input to AERMET to estimate surface energy fluxes and construct boundary layer profiles. These include surface roughness length, albedo, and Bowen ratio. These are assigned on a sector-by-sector and seasonal basis using guidance provided in the AERMET User's Guide. Assessment of the area surrounding Clearwater suggested that landuse is most appropriately categorized as "desert shrubland" for all sectors. Table 5 provides values used for geophysical surface characteristics as a function of month.

Table 5. GEOPHYSICAL SURFCE CHARACTERISTIC FOR THE CLEARWATER AREA

Month	Characteristic		
	Albedo[a]	Bowen Ratio[b]	Surface Roughness (m)
January	0.45	6.0	0.15
February	0.45	6.0	0.15
March	0.3	3.0	0.3
April	0.3	3.0	0.3
May	0.3	3.0	0.3
June	0.28	4.0	0.3
July	0.28	4.0	0.3
August	0.28	4.0	0.3
September	0.28	6.0	0.3
October	0.28	6.0	0.3
November	0.28	6.0	0.3
December	0.28	6.0	0.15

[a] *Fraction of total incident solar radiation reflected without absorption.*
[b] Values are for average moisture conditions, as provided in the AERMET manual.

3.1.4 Terrain Effects

The modeling analyses submitted by Geomatrix considered elevated terrain. Elevations of receptors, buildings, and emissions sources were calculated from United States Geological Survey (USGS) 7.5 minute Digital Elevation Model (DEM) files. Receptor elevations used in the model appeared to be correct, as verified by DEQ spot-checking.

3.1.5 Facility Layout

DEQ verified proper identification of the facility boundary and buildings on the site by comparing the modeling input to a facility plot plan submitted with the application and aerial photographs of the area.

3.1.6 Building Downwash

Plume downwash effects caused by structures present at the facility were accounted for in the modeling analyses. The Building Profile Input Program for the PRIME downwash algorithm (BPIP-PRIME) was used to calculate direction-specific building dimensions and Good Engineering Practice (GEP) stack height information from building dimensions/configurations and emissions release parameters for AERMOD. The standard BPIP program was used for ISCST3.

3.1.7 Ambient Air Boundary

The Potlatch property boundary, encompassing Clearwater, CPD, and IPPD, was used as the ambient air boundary. Although only portions of the property boundary are fenced, supplemental material submitted provided justification that public access is prevented according to methods described in the *Idaho Air Quality Modeling Guideline.* DEQ concurs with Geomatrix's justification for the establishment of the ambient air boundary.

3.1.8 Receptor Network

The receptor grids used by Geomatrix met the recommendations specified in the *Idaho Air Modeling Guideline*, and DEQ determined the receptor spacing used was sufficient to reasonably resolve maximum modeled concentrations.

The receptor grid used for the full impact analyses only included those receptors where ambient impacts from the significant impact analyses exceeded the SCLs. This approach is acceptable for PTCs because the project can only significantly contribute to a NAAQS violation at receptors where the emissions from the project have an impact exceeding the SCLs.

3.1.9 Modeling Approach

Geomatrix conducted the preliminary analysis by modeling potential emissions from the proposed new kilns, negative-valued emissions of the existing kilns, and emission increases from debottlenecked sources. Actual emissions, based on the previous two years of production, were used for the existing kilns. Modeling results were then compared to SCLs to evaluate whether a full impact analysis, using facility-wide potential emissions, was needed to demonstrate compliance with NAAQS.

The proposed new kilns were modeled as point sources, with each kiln represented by five point sources. This effectively merged four roof vents into a single point source. Each of the existing 31 masonry kilns were modeled as a separate point source, as were the three vents of the LSI kiln. DEQ determined this approach was appropriate since some enhanced plume rise, resulting from plume merging, would reasonably be expected because of the close spacing of kiln vents.

Geomatrix used an AERMOD/ISCST3 combination, as described in Section 3.1.2, for both the significant impact analyses and the full impact analyses. DEQ verification analyses were conducted using only AERMOD because of the time needed to conduct the two-model approach. Emission release parameters were modified to partially address the problems associated with using AERMOD for hot, horizontal releases or ambient temperature, vertical releases.

3.2 Emission Rates

Emissions rates used in the dispersion modeling analyses submitted by the applicant were reviewed against those in the permit application, the engineering technical memorandum, and the proposed permit. The following approach was used for DEQ verification modeling:

- All modeled emissions rates were equal to or slightly greater than the facility's emissions calculated in the PTC application or the permitted allowable rate.
- Modeling results were compared to *significant contribution* thresholds. More extensive review of modeling parameters selected was conducted when model results approached applicable thresholds.

Table 6 provides criteria pollutant and TAP emissions quantities for short-term and long-term averaging periods. The capacity of the new kilns is greater than that of the existing kilns, and the increased capacity will debottleneck production to some extent. DEQ requires that any emission increases associated with debottlenecking be accounted for in the air quality analyses. Geomatrix analyzed the emissions increase associated with bebottlenecked production, and these emission increases are provided in Table 7. Geomatrix's calculations showed short-term emission rate increases (lb/hr) that were less than the annual emission rate increase when averaged over 8,760 hours. This occurs because the emission increase is both a result of increased days of operation per year and increased hours per day.

Table 6. CRITERIA POLLUTANT AND TAP EMISSION RATES USED FOR MODELING

Source (Id Code)	Number of Stacks	Rate Used for Modeling (lb/hr)[a]		
		PM_{10}[b]	Acetaldehyde	Formaldehyde
Proposed New Kilns				
New Kilns (KILN1V1 – KILN4V5)	20	0.0758	0.0155	0.00561
Existing Kilns to be Removed				
Masonry Kilns (CWKV1 – CWKV31)	31	-0.0279	Not Modeled	-0.00172
LSI Kiln (LSIV1 – LSIV3)	3	-0.0398	Not Modeled	-0.00174

a. Pounds per hour per stack modeled

b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

Table 7. EMISSION RATE INCREASES FOR DEBOTTLENECKED SOURCES

Source Id	Description	Emission Rates (lb/hr)			
		PM_{10}[a]	SO_2[b]	NO_x[c]	CO[d]
Short-Term Emissions					
CWCY-18	Cyclone - Surfacing, #4 Splitter	0.00261	0.0	0.0	0.0
CWCY-25	Cyclone - Surface., Chipper, Chips	0.105	0.0	0.0	0.0
CWCY-26	Cyclone - Sawmill, all machine ctrs	0.00398	0.0	0.0	0.0
CWCY-27	Cyclone - Sawmill, all machine ctrs	0.0239	0.0	0.0	0.0
CWBH-1	Baghouse – Surfacing	0.309	0.0	0.0	0.0
CWBH-2	Baghouse – Surfacing	0.326	0.0	0.0	0.0
CWBH-3	Baghouse – Surfacing	0.351	0.0	0.0	0.0
PNP781	No. 4 Power Boiler	0.43	0.011	15.8	84.6
Long-Term Emissions					
CWCY-18	Cyclone - Surfacing, #4 Splitter	0.00174	0.0	0.0	0.0
CWCY-25	Cyclone - Surface., Chipper, Chips	0.0696	0.0	0.0	0.0
CWCY-26	Cyclone - Sawmill, all machine ctrs	0.00265	0.0	0.0	0.0
CWCY-27	Cyclone - Sawmill, all machine ctrs	0.0159	0.0	0.0	0.0
CWBH-1	Baghouse – Surfacing	0.411	0.0	0.0	0.0
CWBH-2	Baghouse – Surfacing	0.434	0.0	0.0	0.0
CWBH-3	Baghouse – Surfacing	0.468	0.0	0.0	0.0
PNP781	No. 4 Power Boiler	0.196	0.00525	7.24	38.8

[a] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[b] Sulfur dioxide
[c] *Oxides of Nitrogen*
[d] Carbon monoxide

Modeling of facility-wide emissions was required for PM_{10} since results of the significant impact analyses indicated impacts of PM_{10} exceeding the SCLs. Attachment A provides PM_{10} emissions and emission release parameters of all emission sources.

3.3 Emission Release Parameters

Table 8 provides emissions release parameters, including stack location, stack height, stack diameter, exhaust temperature, and exhaust velocity. Stack temperatures were based on the lower value of the expected range. The stack diameters for the kiln vents were based on the total stack area of the vents represented by the point. This method allows for some enhanced buoyant plume rise resulting from plume interaction, but is far more conservative than modeling all the kilns as a single point source.

DEQ verification analyses for the significant impact analyses were conducted using only AERMOD. To partially address the problem with ambient temperature releases, DEQ modeled the cyclones and baghouses at a temperature of 300 K (80° F).

DEQ facility-wide verification analyses were conducted using two AERMOD analyses to bracket impacts. One analysis was very conservative, not accounting for thermal buoyancy of horizontally-released emissions. The analysis also included releases at ambient temperatures, which may be problematic in AERMOD. The other analysis was not conservative, modeling capped releases as uninterrupted vertical releases and modeling ambient temperature releases at 300 K. This method could under predict impacts from horizontal releases and releases at ambient temperatures. Table 9 provides a comparison of modeling methods used to address specific conditions.

Table 8. EMISSIONS AND STACK PARAMETERS

Release Point / Location	Source Type	Vents represented by a single modeled point	Stack Height (m)[a]	Modeled Diameter (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)[c]
New Kilns (KILN1V1 – KILN4V5)	Point	4	8.2	1.6	355.3	0.35
Masonry Kilns (CWKV1 – CWKV31)	Point	12	6.1	1.84	355.3	0.15
LSI Kiln (LSIV1 – LSIV3)	Point	6	8.2	1.68	355.3	0.21
Debottlenecked Sources						
CWCY-18	Point		12.2	0.91	Amb.[d]	5.2
CWCY-25	Point		7.62	0.91	Amb[d]	3.9
CWCY-26	Point		4.57	0.76	Amb.[d]	52.8
CWCY-27	Point		4.57	0.91	Amb.[d]	23.4
CWBH-1	Point		13.1	1.3	Amb.[d]	12.6
CWBH-2	Point		5.49	1.3	Amb.[d]	13.3
CWBH-3	Point		13.1	1.3	Amb.[d]	14.3
PMP781	Point		91.4	4.11	483	13.1

[a] Meters
[b] Kelvin
[c] Meters per second
[d] DEQ verification modeling was conducted using a stack temperature of 300 K

3.4 *Results*

This section describes the dispersion modeling results for criteria pollutants and TAPs.

3.4.1 Significant and Full Impact Analyses

Table 10 summarizes the results of the significant impact analyses and Figure 1 shows results of the PM_{10} 24-hour significant impact analysis. A full impact analysis, including facility-wide emissions, was needed for PM_{10} 24-hour and annual averaging periods because maximum modeled impacts of the proposed project (new kilns added, existing kilns removed, and increases from debottlenecked sources) were above SCLs.

The difference in values obtained by Geomatrix and those obtained by DEQ verification analyses may be attributed to differences in the modeling methods used. Geomatrix used both AERMOD and ISCST3 for the significant impact analysis because the cyclones and baghouses had releases at ambient air temperatures. Geomatrix indicated that AERMOD would not appropriately account for momentum plume rise when the thermal buoyancy is zero. Using only AERMOD, with ambient temperature releases set to 300 K, likely resulted in dispersion enhancement through thermal buoyancy during periods when the ambient temperature was below 300 K. The assumption of a release temperature equal to the ambient air temperature is very conservative for many sources since the stack gas for some of these sources is composed of indoor air.

Table 9. COMPARISON OF MODELING METHODS FOR SPECIFIC CONDITIONS

Condition	Horizontal release at elevated temp.	Release at ambient temp.	Horizontal release at ambient temp.
Geomatrix Approach Using ISCST3	- set exit velocity to 0.01 m/sec - inflate diameter such that total volumetric flow is accurate	- set exit temp to 0 K (directs model to use the current ambient temp.)	- set exit temp to 0 K - set exit velocity to 0.01 m/sec
Effect	- low exit velocity effectively sets momentum flux to zero - increased diameter enables model to correctly account for plume rise from thermal buoyancy	- effectively eliminates thermal buoyancy effects	- effectively eliminates plume rise from both momentum and thermal buoyancy
	- ISCST3 very conservative in elevated terrain (considered a screening model) - ISCST3 does not calculate concentrations within building recirculation cavities. At several locations, buildings are sufficiently close to the ambient air boundary that receptors would be located within recirculation cavities.		
DEQ Conservative Approach with AERMOD	- set exit velocity to 0.001 m/sec	- set exit temp to 0 K (directs model to use the current ambient temp.)	- set exit temp to 0 K - set exit velocity to *0.01 m/sec*
Effect	Will not account for plume rise from thermal buoyancy	May over predict if AERMOD also sets the momentum flux to zero when buoyancy flux is zero	Should model appropriately since both momentum and buoyancy flux are zero
DEQ NonConservative Approach with AERMOD	- use actual stack velocity	- set exit temp to 300 K	- set exit temp to 0 K - set exit velocity to 0.001 m/sec
Effect	Will under predict because model assumes all exit velocity is in vertical direction – thereby incorrectly applying plume rise through vertical *momentum*	Will under predict during low ambient temp. periods, because temp. differential will cause plume rise through thermal buoyancy	Should model appropriately since both momentum and buoyancy flux are zero

Table 10. RESULTS OF SIGNIFICANT IMPACT ANALYSES

Pollutant	Averaging Period	Maximum Modeled Concentration[a] ($\mu g/m^3$)[b]	Significant Contribution Level ($\mu g/m^3$)	Facility-Wide Modeling Required
PM_{10}[c]	24-hour	15.8 (4.8)	5.0	Yes
	Annual	1.01 (0.89)	1.0	Yes
Carbon Monoxide (CO)	*1-hour*	*130 (130.3)*	2,000	*No*
	8-hour	42 (42.5)	500	No
Sulfur Dioxide (SO_2)	3-hour	0.01 (0.010)	25	No
	24-hour	*0.002 (0.0021)*	*5*	*No*
	Annual	0.00007 (0.00007)	1.0	No
Nitrogen Dioxide (NO_2)	Annual	0.1 (0.10)	1.0	No

[a] Values in parentheses are modeling results obtained by DEQ verification.
[b] Micrograms per cubic meter
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

Table 11 provides a summary of the full impact analysis. Geomatrix modeled facility-wide emissions only at those receptor locations where the emission increase associated with the proposed project had an impact exceeding the SCLs. Modeled impacts, when combined with a conservative background concentration, were below NAAQS. DEQ did not run verification analyses for the two-model, limited receptor, full impact analyses conducted by Geomatrix. Results of the significant impact analyses, those submitted by Geomatrix and DEQ verification analyses, were not substantially above SCLs and the modeling files submitted by Geomatrix indicated appropriate methods and procedures were used. DEQ did use emission and source parameter data from Geomatrix's analyses to conduct facility-wide modeling using AERMOD with a full receptor grid. These analyses are described in Section 3.5 and were conducted to evaluate the need for additional analyses, outside of the scope of the kiln replacement project, for NAAQS compliance.

Table 11. RESULTS OF FULL IMPACT ANALYSES

Pollutant	Averaging Period	Maximum Modeled Concentration (μg/m³)[a]	Background Concentration (μg/m³)	Total Ambient Impact (μg/m³)	NAAQS (μg/m³)	Percent of NAAQS
PM_{10}[b]	24-hour	50	68	118	150	79
	Annual	9.3	24.9	34.2	50	68

[a] Micrograms per cubic meter
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

3.4.2 TAP Analyses

Compliance with the acetaldehyde TAP increment was demonstrated by modeling only the emissions from the proposed new kilns, without consideration of emission decreases associated with removal of the existing kilns, as per IDAPA 58.01.01.210.08. Modeling of net emissions, as per IDAPA 58.01.01.210.10, was needed to demonstrate compliance with the formaldehyde TAP increment. The only other formaldehyde emission changes at Clearwater since July 1, 1995 (definition of net emissions increase for TAPs as per IDAPA 58.01.01.007.06) is the proposed removal of the old kilns.

Table 12 summarizes the ambient TAP analyses. DEQ verification analyses were only conducted for 1992 meteorological data, since results obtained from Geomatrix indicated these data generated the highest annual average TAP concentrations. Maximum annual impacts of acetaldehyde and formaldehyde were well below the applicable AACC. Emissions of all non-carcinogenic TAPs were below the screening emission levels (ELs), below which dispersion modeling is not required.

Table 12. RESULTS OF TAP ANALYSES

TAP	Averaging Period	Maximum Modeled Concentration[a] (μg/m³)[b]	AACC (μg/m³)	Percent of AACC
Acetaldehyde	Annual	0.272 (0.262)	0.45	60
Formaldehyde	Annual	0.038 (0.037)	0.077	49

[a] Values in parentheses are modeling results obtained by DEQ verification analyses
[b] Micrograms per cubic meter
[c] Universal Transverse Mercator
[d] Meters
[e] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

3.5 *Additional DEQ Analyses*

DEQ staff conducted several independent analyses to assure impacts associated with the project and the facility comply with NAAQS. The first analysis involved modeling the new kilns by themselves, without modeling negative emission values associated with the removal of the existing kilns. Since the existing kilns had not been previously analyzed to evaluate their impact on air quality, this analysis was performed to ensure the new kilns by themselves would not cause a violation of NAAQS. The second analysis involved facility-wide modeling to evaluate facility-wide impacts at all receptor locations; not only those where the proposed project was estimated to have a significant impact.

3.5.1 Impact of only New Kilns

DEQ staff modeled impacts from only the new kilns to ensure that emissions from the new kilns would not, by themselves, exceed NAAQS. Results of these analyses, shown in Table 13, indicated that impacts would exceed SCLs but would remain well below the NAAQS.

Table 13. IMPACT OF NEW KILNS ONLY

Pollutant	Averaging Period	Year/ Scenario	Maximum Modeled Concentration ($\mu g/m^3$)[a]	Significant Contribution Level ($\mu g/m^3$)	Exceeds SCL	NAAQS ($\mu g/m^3$)	Exceeds NAAQS[b]
PM_{10}[c]	24-hour	1992	9.00	5.0	Yes	150	No
	Annual	1992	1.3[d]	1.0	Yes	50	No

[a] Micrograms per cubic meter
[b] Including background concentrations
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[d] DEQ only modeled 1992 data for verifying annual modeled results.

3.5.2 Facility-Wide Impacts

Facility-wide emissions, including those associated with IPPD and CPD, were submitted with the Kiln Replacement PTC application to evaluate facility-wide impacts at those receptors where the proposed project was shown to have an impact exceeding SCLs. There were 37 receptors for the 24-hour PM_{10} analysis and one receptor for the annual analysis. DEQ used the full receptor grid, as was used for the significant impact analyses, for a full impact screening evaluation analysis.

This analysis was conducted to evaluate the need for refined facility-wide (Clearwater, IPPD, and CPD) analyses to determine NAAQS compliance at all ambient air locations. The modeling submitted by Geomatrix has adequately demonstrated compliance with all applicable rules for the kiln replacement project. However, those analyses do not assess facility-wide impacts at all ambient air locations.

The full impact analyses submitted by Geomatrix, as described in Section 3.1.2, utilized an hour-by-hour, receptor-by-receptor combination of AERMOD and ISCST3. DEQ used two simplistic approaches for a screening-level analysis, each using only AERMOD and only meteorological data from 1992. AERMOD was used by adjusting the release parameters to avoid or minimize the previously discussed complications with the PRIME algorithm and AERMOD code. The first method used conservative release parameters that negate the effects of thermal buoyancy for horizontal releases. This method, using AERMOD with conservative release parameters, may over-estimate impacts because enhanced dispersion is not accounted for in some sources where it should. The second method is not conservative, potentially accounting for enhanced dispersion where none actually exists.

Tables 14 and 15 summarize the strengths and weaknesses of the two approaches. None of these analyses can be considered as acceptably accurate. It is recommended that for large, multi-sourced facilities, methods used should more closely represent actual release characteristics than methods that are considered overly conservative for a specific source. Using overly conservative and unrealistic modeling parameters can, in some instances, result in modeled concentrations that under predict actual impacts. This can occur because changing the release parameters may not only change the magnitude of maximum impacts, but may also change the location of maximum impacts. An actual hot spot, resulting from combined impacts of numerous sources, could be under predicted by using unrealistic parameters that effectively move some source impact locations away from the hot spot. However, it is not feasible, within the context of this kiln replacement project, to use the dual model approach, utilized by Geomatrix for the kilns, for facility-wide impacts for all receptor locations. The large number of sources and receptors would demand an unreasonable level of data management computing resources, at least for new source review applications.

Attachment I provides facility-wide modeled emission rates and associated release parameters for each of the methods.

Table 14. AFFECT OF USING AERMOD WITH CONSERVATIVE RELEASE PARAMETERS TO ESTIMATE IMPACTS

Modeled Component	Affect of Change	Conservatism of Modeled Impacts
Exit velocities for all horizontal and rain-capped sources were set to 0.001 m/sec to eliminate momentum flux.	Because of the problems with PRIME, the stack diameters were not increased to account for thermal buoyancy. This approach will negate thermal buoyancy for sources with releases above ambient temperature.	Reasonably accurate for low temperature/low velocity flows. Very conservative for high temperature/high velocity flows.
All ambient temperature releases were set to a temperature of 0 K to eliminate buoyancy flux.	Because of the problems with AERMOD, this may also effect momentum induced plume rise for sources with vertical releases.	Reasonably accurate for horizontal releases. Very conservative for high flow vertical releases.
Terrain	AERMOD is more accurate for estimating concentrations in complex terrain.	More accurate, less conservative than ISCST3.
Downwash	ISCST3 cannot calculate concentrations within building recirculation cavities and the PRIME algorithm is generally accepted as a more accurate model for downwash.	More accurate, neither more nor less conservative than algorithm in ISCST3.

Table 15. AFFECT OF USING AERMOD WITH NON-CONSERVATIVE RELEASE PARAMETERS TO ESTIMATE IMPACTS

Modeled Component	Affect of Change	Conservatism of Modeled Impacts
Change exit velocities for all horizontal and rain-capped sources from 0.001 m/sec to actual rates	This will allow thermal buoyancy to be accurately accounted for, but could result in substantial overestimation of momentum-induced plume rise.	Reasonably accurate for high temperature/low velocity flows. Not conservative for low temperature/high velocity flows.
Change all ambient temperature releases to a temperature of 300 K	This will minimize the problems associated with using an ambient air release temperature.	If actual releases are at ambient temperature, this method would not be conservative during periods when the ambient temperature is below 300 K.
Terrain	AERMOD is more accurate for estimating concentrations in complex terrain.	More accurate, less conservative than ISCST3.
Downwash	ISCST3 cannot calculate concentrations within building recirculation cavities and the PRIME algorithm is generally accepted as a more accurate model for downwash.	More accurate, neither more nor less conservative than algorithm in ISCST3.

Table 16 presents results of DEQ's preliminary facility-wide modeling. These results should not be considered as a representative characterization of actual impacts; but rather a preliminary screening analysis to assess whether a more refined analysis is warranted to adequately demonstrate whether facility-wide impacts, when combined with appropriate background concentrations, are below applicable NAAQS.

Table 16. RESULTS OF DEQ PRELIMINARY FACILITY-WIDE PM_{10}[a] MODELING

Modeling Approach	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[b]	Background Concentration	Total Ambient Concentration	NAAQS	Percent of NAAQS
AERMOD, non-Conservative, 1992 only	24-hour	167[c] 157[d]	68	235[c] 225[d]	150	157[c] 150[d]
	annual	37.0	24.9	61.9	50	124
AERMOD, Conservative, 1992 only	24-hour	214[c] 204[d]	68	282[c] 272[d]	150	188[c] 181[d]
	annual	57.5	24.9	82.4	50	165

[a] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[b] Micrograms per cubic meter.
[c] The maximum 1[st]-high modeled concentration
[d] The maximum 2[nd]-high modeled concentration

Figures 2 and 3 provide 24-hour and annual PM_{10} contours for facility-wide emissions using the non-conservative methods outlined above. Regardless of appropriate background concentrations, the method used does not demonstrate compliance with the 24-hour or annual PM_{10} NAAQS. Furthermore, the method utilized non-conservative assumptions for emission release parameters. All horizontal releases were modeled by the AERMOD non-conservative run as vertical releases to allow the PRIME algorithm to account for thermal buoyancy of hot stack gases. This could substantially underestimate impacts.

Figure 4 shows 1[st] high 24-hour PM_{10} contours for using AERMOD with conservative release parameters that tend to overestimate impacts. Using a typical background value of 68 $\mu g/m^3$, the model indicates that the PM10 24-hour NAAQS could be exceeded at numerous areas along the facility ambient air boundary and at areas north and northeast of the facility.

4.0 CONCLUSIONS

The modeling analyses conducted for the Kiln Replacement project demonstrated to the satisfaction of DEQ that emissions from the project will not cause or significantly contribute to an violation of any ambient air quality standard. Data and information submitted in support of this PTC application do not demonstrate that facility-wide emissions from Clearwater, CPD, and IPPD would not cause or significantly contribute to an exceedance of the PM_{10} NAAQS at all ambient air locations. It is suggested that refined facility-wide modeling be conducted outside of this kiln replacement permit to evaluate combined impacts for Clearwater, CPD, and IPPD.

Using AERMOD for buoyant emissions released horizontally is currently not feasible because of the problems associated with artificially increasing stack diameters to force an appropriate calculation of the buoyancy flux. Using a two model system, ISCST3 for horizontal releases and AERMOD for other sources, is not reasonably feasible because of the vast computing time and data handling/storage required. However, it is DEQ's understanding that AERMOD will be modified to address this issue. When this is accomplished, facility-wide modeling should be conducted to address NAAQS concerns and, if needed, permit limits established/changed to ensure attainment of NAAQS.

Figure 1 - Significant Impact Analysis - PM10 Modeling, AERMOD

1st High 24-Hour Averaged Concentrations in ug/m3

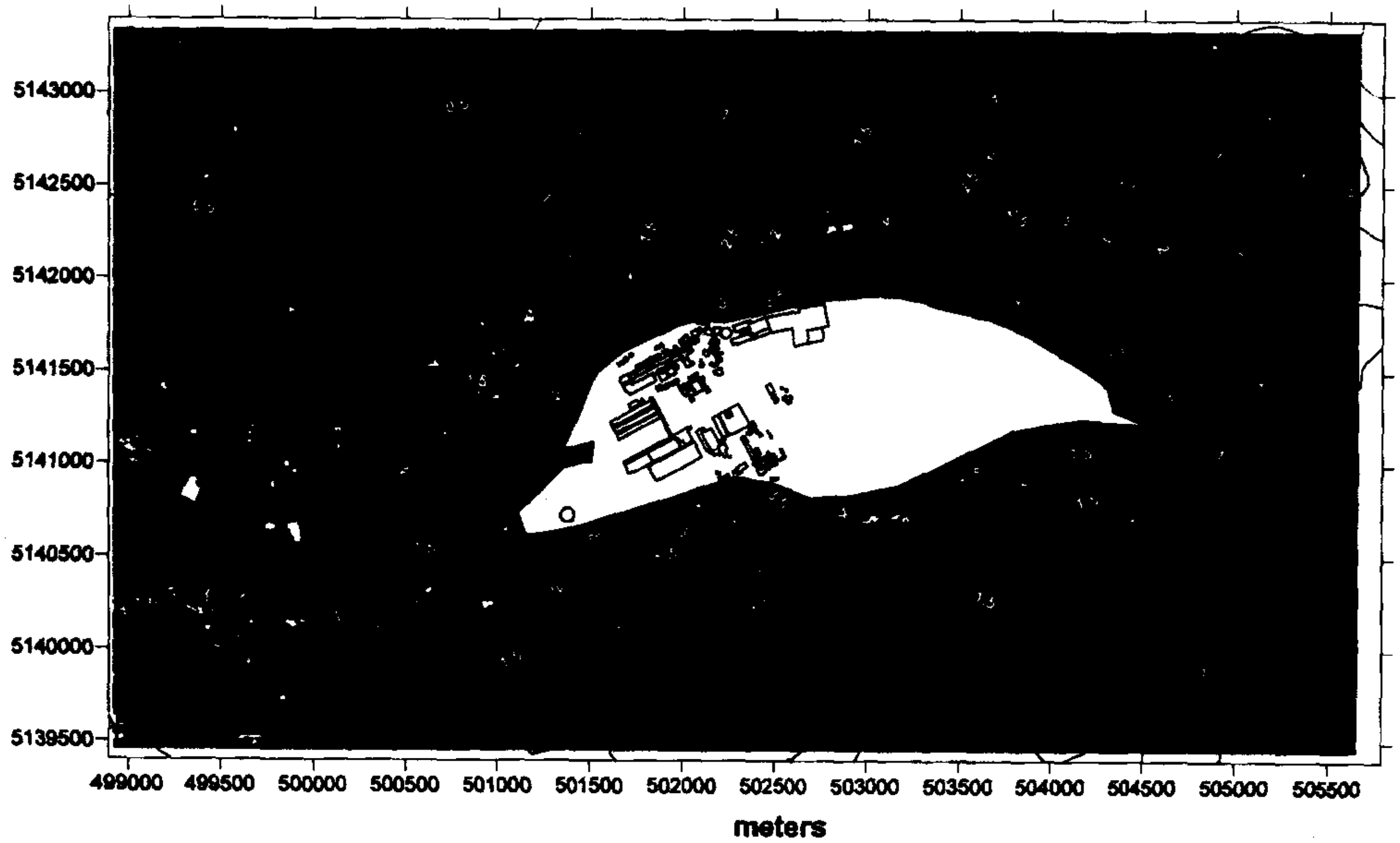


Figure 2 - DEQ Preliminary Facility-Wide Impact Analysis

PM10 Modeling, AERMOD, Non-Conservative Assumptions

1st High 24-Hour Averaged Concentrations in ug/m3 with Conservative Background

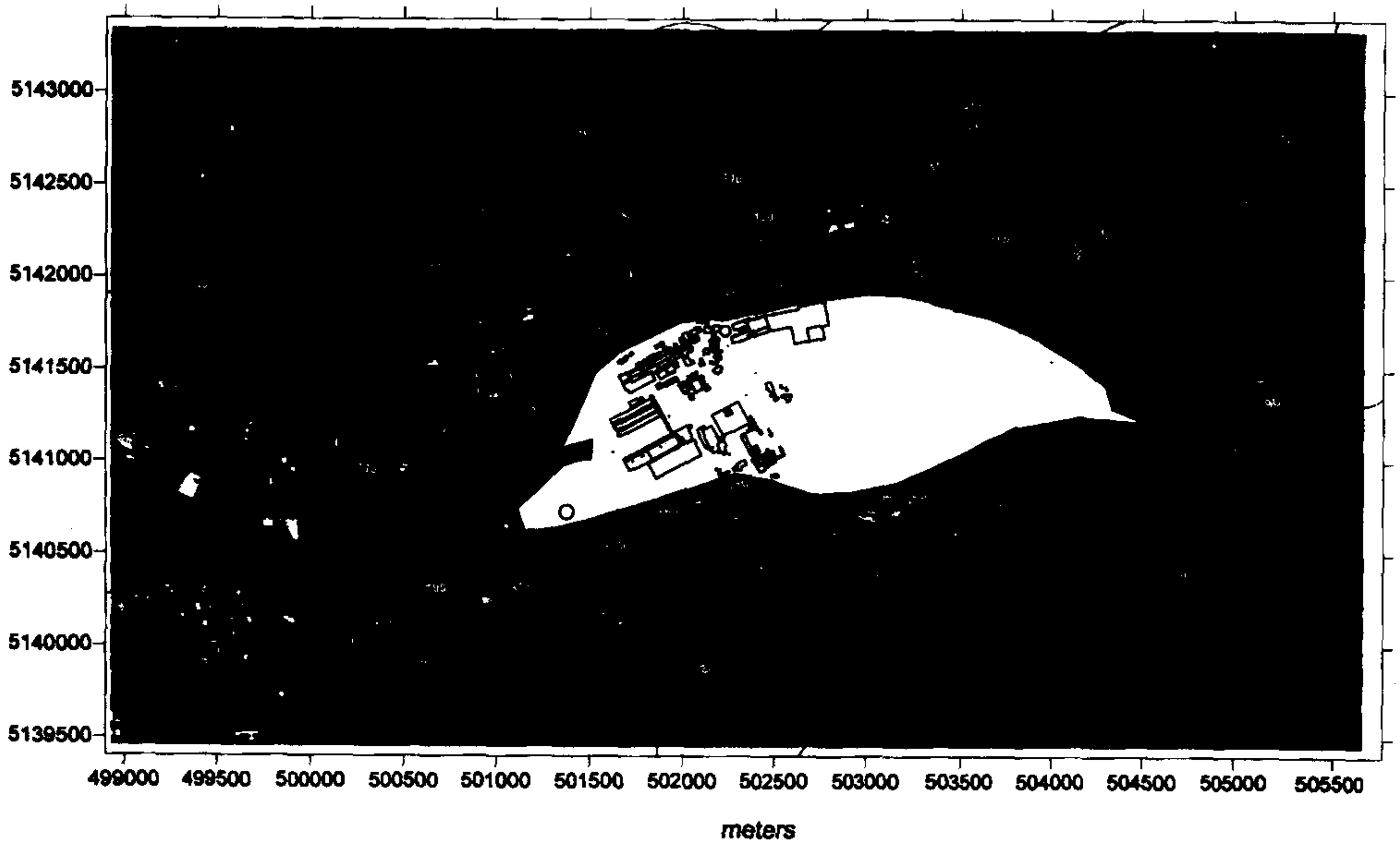


Figure 2 - DEQ Preliminary Facility-Wide Impact Analysis

PM10 Modeling, AERMOD, Non-Conservative Assumptions

1st High 24-Hour Averaged Concentrations in ug/m3 with Conservative Background

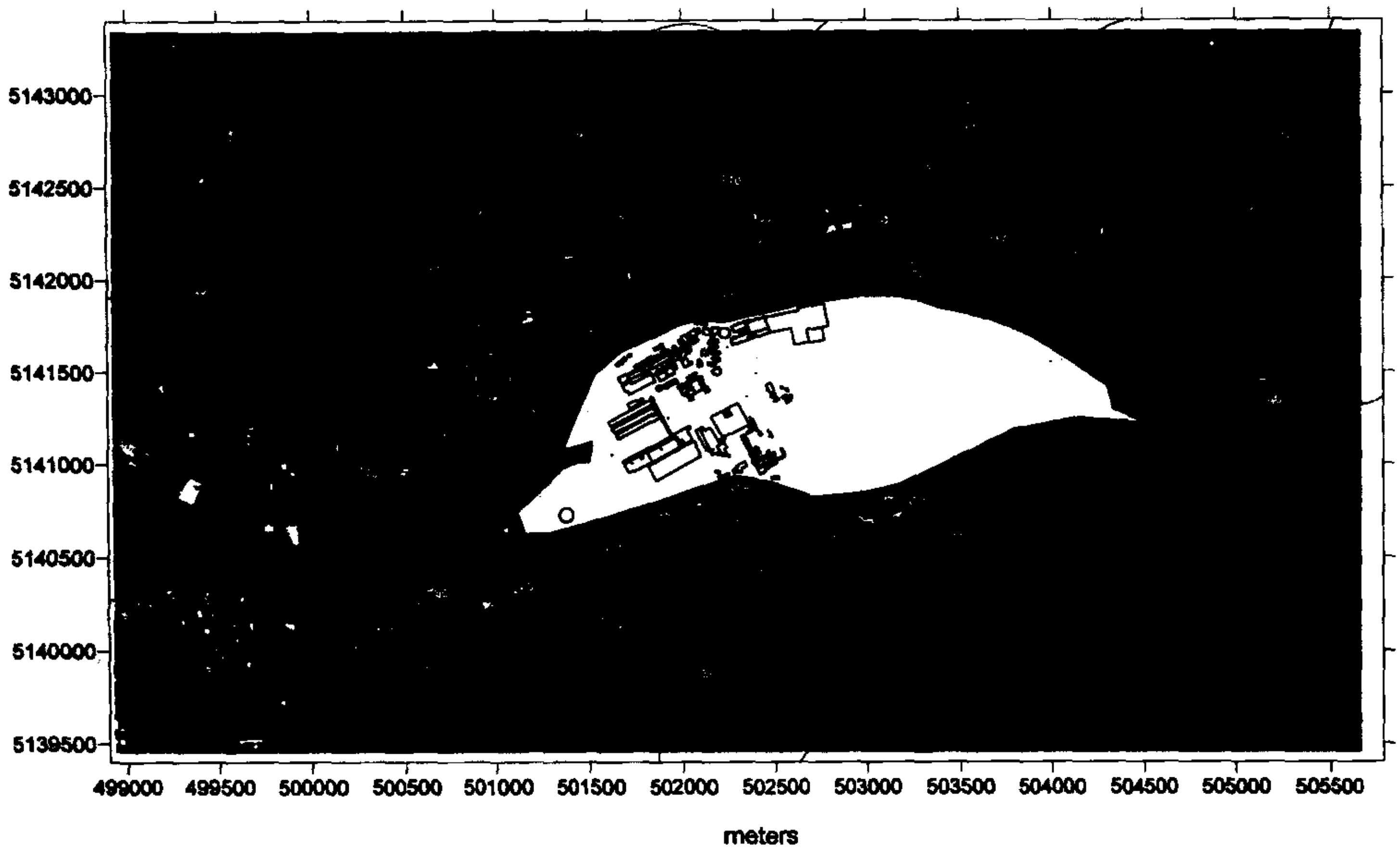


Figure 3 - DEQ Preliminary Facility-Wide Impact Analysis

PM10 Modeling, AERMOD, Non-Conservative Assumptions

Annual Averaged Concentrations in ug/m3 with Conservative Background

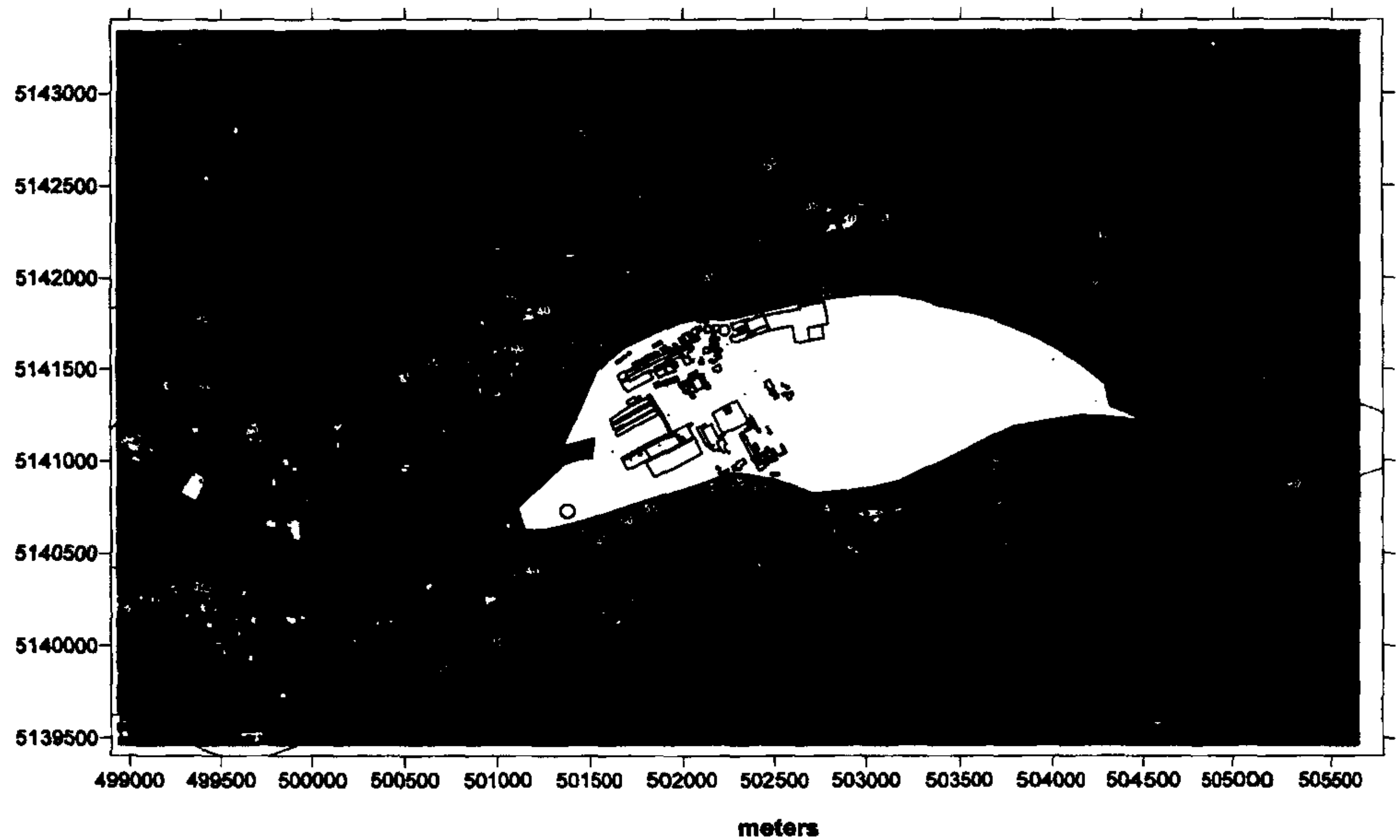
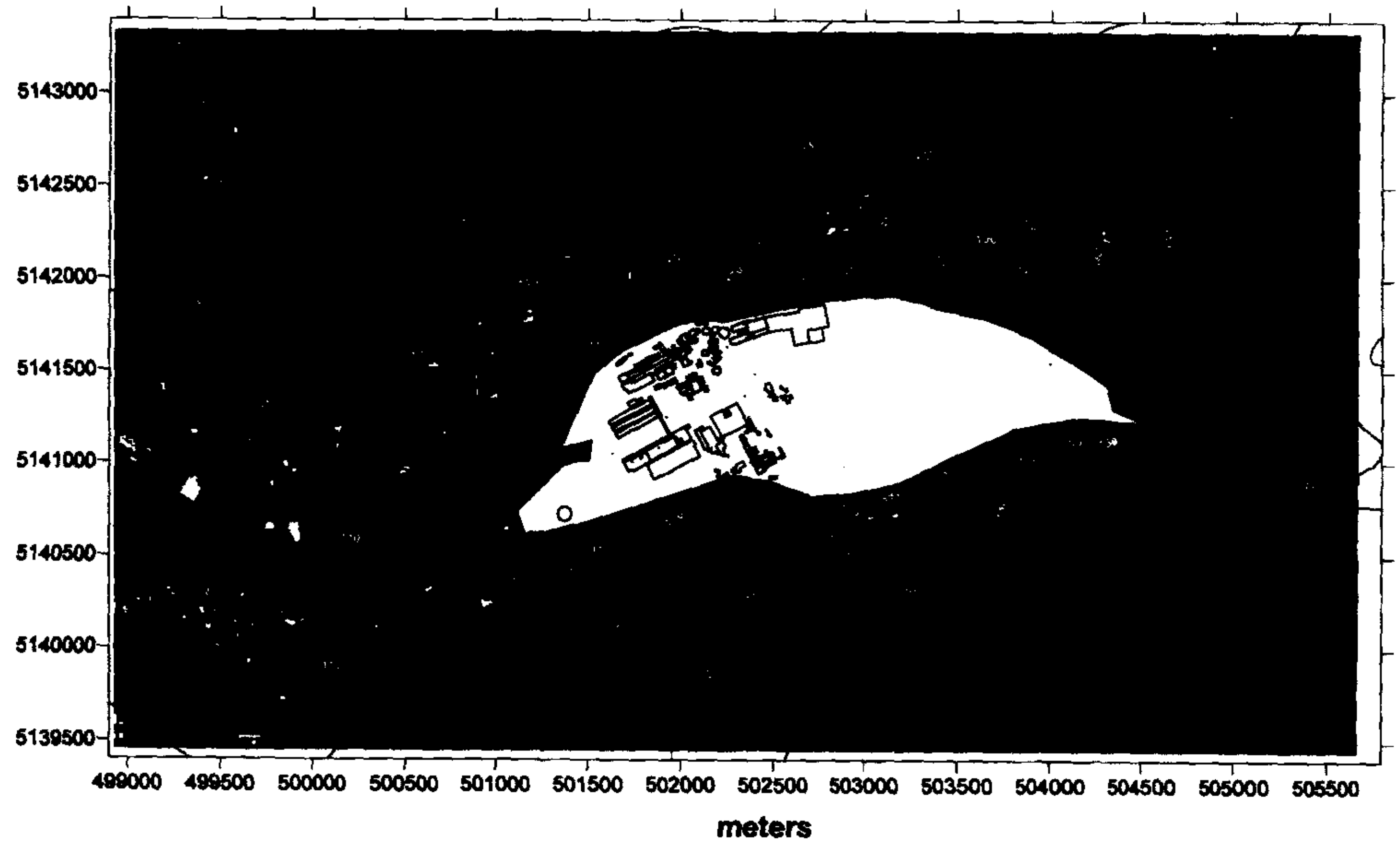


Figure 4 - DEQ Preliminary Facility-Wide Impact Analysis

PM10 Modeling, AERMOD, Conservative Assumptions

1st High 24-Hour Averaged Concentrations in ug/m3 with Conservative Background



ATTACHMENT 1

FACILITY-WIDE MODELED EMISSION RATES AND RELEASE PARAMETERS

Modeling run for AERMOD and ISCST3													
	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM10 Emission (lb/hr)	Model used by Geomatrix	Special Approach
33	KILN1V1	new lumber drying kilns	502225.8	5141277	236.42	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
34	KILN1V2	new lumber drying kilns	502232.8	5141281	236.46	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
35	KILN1V3	new lumber drying kilns	502239.9	5141284	236.56	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
36	KILN1V4	new lumber drying kilns	502247	5141288	236.58	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
37	KILN1V5	new lumber drying kilns	502254	5141292	236.58	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
38	KILN2V1	new lumber drying kilns	502230.3	5141268	236.62	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
39	KILN2V2	new lumber drying kilns	502237.4	5141272	236.65	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
40	KILN2V3	new lumber drying kilns	502244.5	5141275	236.67	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
41	KILN2V4	new lumber drying kilns	502251.5	5141279	236.65	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
42	KILN2V5	new lumber drying kilns	502258.6	5141283	236.73	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
43	KILN3V1	new lumber drying kilns	502234.9	5141259	236.81	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
44	KILN3V2	new lumber drying kilns	502241.9	5141263	236.85	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
45	KILN3V3	new lumber drying kilns	502249	5141267	236.83	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
46	KILN3V4	new lumber drying kilns	502256.1	5141270	236.86	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
47	KILN3V5	new lumber drying kilns	502263.1	5141274	236.83	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
48	KILN4V1	new lumber drying kilns	502239.4	5141250	236.99	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
49	KILN4V2	new lumber drying kilns	502246.5	5141254	236.96	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
50	KILN4V3	new lumber drying kilns	502253.6	5141258	236.96	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
51	KILN4V4	new lumber drying kilns	502260.6	5141261	236.99	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
52	KILN4V5	new lumber drying kilns	502267.7	5141265	236.92	8.2296	355.37	0.349	1.605	0.0757	AERMOD	
53	PNP189	No. 4 recovery	502063.1	5141662	235	99.0612	449.82	13.18	2.7432	40.63	AERMOD	
54	PNP774	sawdust transfer cyclone	501932.9	5141617	234.76	38.7101	-5	1.64	1.0668	5.27	AERMOD	
55	PNP775	sawdust transfer cyclone	501937.2	5141608	234.7	36.2716	-5	1.64	1.0668	5.27	AERMOD	
56	PNP157	No. 4 smelt dissolving tank	502078.7	5141661	235	65.5328	344.26	14.37	0.9144	8.28	AERMOD	
57	PNP721	No. 5 recovery	502081.2	5141716	235.31	106.6813	449.82	30.94	2.7432	58.00	AERMOD	
58	PNP204	No. 5 smelt dissolving tank	502082.4	5141703	235.23	63.3992	349.82	7.18	1.585	10.40	AERMOD	
59	PNP709	No. 1 PM coater burners	501870.5	5141512	234.6	20	320	13	1.53	0.111	AERMOD	
60	PNP2009	No. 2 PM coater burners	501778.2	5141507	234.6	20	311	12.8	1.37	0.111	AERMOD	
61	PNP510	No. 2 lime kiln	502144.6	5141590	234.7	30.4804	347.04	6.001	0.9754	7.23	AERMOD	
62	PNP511	No. 3 lime kiln	502191	5141597	234.6	46.7874	463.98	24.1	1.143	5.20	AERMOD	

Modeling run for AERMOD and ISCST3												
	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM10 Emission (lb/hr)	Model used by Geomatrix	Special Approach
63	PNP512	No. 4 lime kiln	502171.6	5141572	234.6	46.7874	463.71	24.055	1.143	5.20	AERMOD	
64	PNP43	slaker vent	502114.2	5141530	235	20.4218	374.82	12.65	0.4054	1.72	AERMOD	
65	PNP106	NCG incinerator	502114.1	5141584	234.94	28.9868	455.37	7.227	0.6706	0.030	AERMOD	
66	PNP250	No. 1 power boiler	502050.7	5141622	234.98	25.2987	449.82	12.437	2.4079	2.85	AERMOD	
67	PNP253	No. 2 power boiler	502021	5141631	234.82	25.2987	437.59	18.143	2.0988	27.6	AERMOD	
68	PNP781	No. 4 power boiler	502503.9	5141353	232.3	91.4411	483.15	13.132	4.1149	90.4	AERMOD	
70	CPD29	1L tissue machine hood exhaust	502246	5141632	234.71	11.4301	572.04	7.69	1.2192	0.242	AERMOD	
71	CPD52	2L dust scrubber stack	502361	5141767	236.16	9.1441	308.15	12.244	1.7374	2.63	AERMOD	
72	CPD39	2L tissue machine hood exhaust	502340.3	5141756	236.16	23.4089	488.71	6.685	1.7197	0.986	AERMOD	
73	CPD82	temporary boiler	502279.2	5141685	235.28	6.0351	680.93	7.473	1.3864	0.940	AERMOD	
74	CPD83	temporary boiler	502283.8	5141687	235.36	5.1817	556.48	6.203	1.8838	0.940	AERMOD	
75	CPD12	3L tissue machine hood exhaust	502316.6	5141661	235.4	26.8227	533.15	6.72	1.1583	1.40	AERMOD	
76	CWIC1	internal combustion engine	501630	5141050	221	4.57	817	41.23	0.1006	0.115	AERMOD	
77	CWIC2	internal combustion engine	501631	5141050	221	4.57	817	41.23	0.1006	0.0156	AERMOD	
78	CWIC3	internal combustion engine	501925	5141250	228.25	4.57	817	41.23	0.1006	0.0156	AERMOD	
79	CWIC4	internal combustion engine	501926	5141250	226.8	4.57	817	41.23	0.1006	0.0156	AERMOD	
80	CWIC5	internal combustion engine	504000	5141550	232.3	2.4384	817	30.316	0.1006	0.0156	AERMOD	
1	PNP464	dry additives handling baghouse	501892.7	5141610	234.6	20.7267	0	0.01	0.253	0.0450	ISCST3	horizontal release, amb. Temp
2	PNP465	dry additives handling baghouse	501897	5141611	234.61	20.7267	0	0.01	0.2438	0.0418	ISCST3	horizontal release, amb. Temp
3	PNP466	dry additives handling baghouse	501901.1	5141613	234.63	20.7267	0	0.01	0.2438	0.0418	ISCST3	horizontal release, amb. Temp
4	PNP513	pulp dryer drying	501808.2	5141504	234.6	20.1	460.93	0.01	46.1875 (1.06)	0.773	ISCST3	horizontal release, increased diameter
5	PNP514	pulp dryer drying	501794.3	5141496	234.6	20.1	460.93	0.01	46.1875 (1.07)	0.773	ISCST3	horizontal release, increased diameter
6	PNP1030	No. 5 recovery saltcake system	502071.5	5141730	235.4	29.6	-5	0.01	7.7519 (0.15)	1.50	ISCST3	horizontal release, amb. Temp -5
7	PNP1119	No. 4 recovery saltcake system	502081.7	5141667	235	29.6	-5	0.01	6.7134 (0.24)	1.50	ISCST3	horizontal release, amb. Temp -5
8	PNP47	lime handling baghouse	502090.1	5141540	235	5.8	491.5	0.01	18.9883 (0.64)	0.514	ISCST3	horizontal release, increased diameter
9	PNP324	backup diesel generator	502031	5141703	235.13	2.4079	817	0.01	12.1336	0.108	ISCST3	horizontal release, increased diameter

	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Stack Height (m)	Temp (K)	Exit Velocity (m/s)	Stack Diameter (m)	PM10 Emission (lb/hr)	Model used by Geomatrix	Special Approach
									(0.15)			
10	PNP103	backup diesel generator	501980.8	5141413	235.11	2.4079	817	0.01	12.1336 (0.15)	0.108	ISCST3	horizontal release, increased diameter
11	PNP383	dry fuel bin (baghouse)	502366.3	5141249	236.92	4.5721	0	19.484	1.3716	2.72	ISCST3	amb. Temp
12	PNP432	dry fuel bin (baghouse)	502366.3	5141249	236.91	4.6025	0	29.8	1.2192	3.70	ISCST3	amb. Temp
13	PNP782	trash hog	502473.3	5141168	232.3	17.069	0	0.01	54.502 (2.01)	11.0	ISCST3	horizontal release, amb. Temp
14	CPD28A	1L tissue machine dust scrubber	502357.8	5141730	236	14.3258	0	11.863	1.4234	0.120	ISCST3	amb. Temp
15	CPD2	3L tissue machine dust scrubber	502354.8	5141684	235.7	22.4031	293.15	12.29	1.524	1.50	ISCST3	amb. Temp
16	CPD56	valmet rewinder dust scrubber stack	502403.8	5141786	235.11	10.8205	0	5.61	1.524	0.740	ISCST3	amb. Temp
17	CWBH1	c.w. baghouse 1	502248.7	5141042	240.01	13.1064	0	12.59	1.3106	0.926	ISCST3	amb. Temp
18	CWBH2	c.w. baghouse 2	502256.7	5141036	240.1	5.4864	0	13.286	1.3106	0.977	ISCST3	amb. Temp
19	CWBH3	c.w. baghouse 3	502258.9	5141047	239.94	13.1064	0	14.34	1.3106	1.05	ISCST3	amb. Temp
20	CWBH4	c.w. baghouse 4	501998	5141097	237.43	2.7432	0	18.191	1.2192	1.16	ISCST3	amb. Temp
21	CWBH5	c.w. baghouse 5	501995.9	5141103	237.39	2.7432	0	17.391	1.2192	1.11	ISCST3	amb. Temp
22	CWBH6	c.w. baghouse 6	501992.7	5141109	237.34	2.7432	0	14.141	1.2192	0.900	ISCST3	amb. Temp
23	CWBH7	c.w. baghouse 7	501988.3	5141117	237.2	2.7432	0	13.34	1.2192	0.849	ISCST3	amb. Temp
24	CWCY1	c.w. cyclone 1	501733.7	5141004	237.42	12.192	0	5.336	1.2192	0.0694	ISCST3	amb. Temp
25	CWCY2	c.w. cyclone 2	501781.2	5141025	237.61	12.192	0	7.257	0.9144	0.0146	ISCST3	amb. Temp
26	CWCY3	c.w. cyclone 3	501789.5	5141030	237.6	12.192	0	7.399	0.9144	0.0319	ISCST3	amb. Temp
27	CWCY4	c.w. cyclone 4	501789.9	5141036	237.49	12.192	0	5.174	0.9144	0.174	ISCST3	amb. Temp
28	CWCY6	c.w. cyclone 6	501884	5141079	237.63	12.192	0	9.314	0.762	0.107	ISCST3	amb. Temp
29	CWCY18	c.w. cyclone 18	502170.2	5141080	238.4	12.192	0	5.174	0.9144	0.00391	ISCST3	amb. Temp
30	CWCY25	c.w. cyclone 25	502354.4	5141126	238.57	7.62	0	3.918	0.9144	0.157	ISCST3	amb. Temp
31	CWCY26	c.w. cyclone 26	502405.6	5141054	238.93	4.572	0	52.779	0.762	0.00597	ISCST3	amb. Temp
32	CWCY27	c.w. cyclone 27	502417.8	5141064	238.69	4.572	0	23.358	0.9144	0.0179	ISCST3	amb. Temp

	Source ID	Source Description	Easting (X) (m)	Northing (Y) (m)	Base Elevation (m)	Release Height (m)	East. Length (m)	North. Length (m)	Angle from North	Vertical Dimension (m)	PM10 Emission (lb/hr)
38	CHAND	chip handling	502400	5141488	232.3	9.1	243.8	152.4	-29	4.25	0.0988
39	DRYASH1	dry ash system bottom ash bunker	502456	5141399	232.3	6.1	6.1	6.1	-29	2.83	0.000193
40	DRYASH2	dry ash system precipitator bunker	502476	5141362	232.3	6.1	6.1	6.1	-29	2.83	0.000193
41	HFSYS	hog fuel system	502470	5141150	232.3	9.1	91.4	243.8	-29	4.25	0.0994
42	SHAND	sawdust handling	502344	5141363	232.3	9.1	91.4	121.9	-29	4.25	0.0506

Appendix D

Emission Factor Documentation

P-050200

OREGON DEQ

WOOD PRODUCTS

EMISSION FACTORS

JUNE 26, 2003

Process Equipment	Description	Throughput Units	Pounds of Pollutant per Throughput Unit[1]				
			PM[2]	SO_2	NO_x	CO	VOC
Wood-Fired Boilers	Dutch Oven	1000 lb steam	0.4[3]	0.014	0.31[4]	3.0[4]	0.13
	Spreader-Stoker	1000 lb steam	0.4[3]	0.014	0.31[4]	2.0[4,5]	0.13
	Fuel Cell	1000 lb steam	0.4[3]	0.014	0.31[4]	1.0[4,6]	0.13
Veneer Dryer – Gas Heat	Doug Fir (uncontrolled)	1000 ft^2 (3/8" basis)	0.52	NA[7]	0.12	0.02	0.22
	Doug Fir (Burley or 45% control)	1000 ft^2 (3/8" basis)	0.29	NA	0.12	0.02	0.22
	Hemlock, White Fir (uncontrolled)	1000 ft^2 (3/8" basis)	0.15	NA	0.12	0.02	0.22
	Hemlock, White Fir (Burley or 45% control)	1000 ft^2 (3/8" basis)	0.10	NA	0.12	0.02	0.22
Veneer Dryer – Steam Heat	Doug Fir (uncontrolled)	1000 ft^2 (3/8" basis)	1.01	NA	NA	NA	0.04
	Doug Fir (Burley or 45% control)	1000 ft^2 (3/8" basis)	0.56	NA	NA	NA	0.04
	Hemlock, White Fir (uncontrolled)	1000 ft^2 (3/8" basis)	0.25	NA	NA	NA	0.04
	Hemlock, White Fir (Burley or 45% control)	1000 ft^2 (3/8" basis)	0.15	NA	NA	NA	0.04
Veneer Dryer – Wood Fired	All species (<20% moisture in fuel)	1000 ft^2 (3/8" basis)	0.75[8]	NA	0.4	1.4	0.2
	All species (≥20% moisture in fuel)	1000 ft^2 (3/8" basis)	1.50	NA	0.4	1.4	0.2
Cyclone- Dry and Green chips, Shavings, Hogged Fuel/Bark, Green Sawdust	Medium Efficiency	Bone dry tons	0.5	NA	NA	NA	NA
	High Efficiency	Bone dry tons	0.2	NA	NA	NA	NA
	Baghouse control	Bone dry tons	0.001	NA	NA	NA	NA
Cyclone - Sanderdust	High Efficiency	Bone dry tons	2.0	NA	NA	NA	NA
	Baghouse control	Bone dry tons	0.04	NA	NA	NA	NA
Target Box		Bone dry tons	0.1	NA	NA	NA	NA
Lumber Dry Kilns	Douglas Fir	1000 board feet	0.02[9]	NA	NA	NA	0.5[10]
	Hemlock	1000 board feet	0.05[9]	NA	NA	NA	0.25[9]
	Ponderosa Pine	1000 board feet	ND[11]	NA	NA	NA	1.4[10]
Press Vents - uncontrolled	Particleboard	1000 ft^2 (3/4" basis)	SS[12]	NA	NA	NA	SS
	Hardboard	1000 ft^2 (1/8" basis)	SS	NA	NA	NA	SS

[1] The emissions factors listed in this table should only be used when better information (i.e., source test data) is not available.
[2] The PM_{10} fraction is dependent upon the type of control equipment. See AQ-EF03 for estimated PM_{10} fractions.
[3] The PM factors are equivalent to 0.1 gr/dscf at 65% boiler efficiency. For other allowable emissions concentrations, the emission factor may be ratioed (e.g., 0.2/0.1 gr/dscf x 0.40 = 0.80 lb/10^3 steam).
[4] These factors are based on collective source tests as of 1992.
[5] Spreader-Stokers with small combustion chambers may exhibit higher CO levels.
[6] Recent tests have shown CO levels in the range of 0.1 to 0.5.
[7] There is no applicable emission factor because the pollutant is either not emitted or emitted at negligible levels.
[8] Based on statewide rule limit.
[9] Based on OSU study (Willamette Industries)
[10] Based on University of Idaho study (NCASI) and reported as pounds of carbon per 1000 board feet.
[11] No data available, but expected to be less than Douglas Fir factor.
[12] Use source specific data because most plants have performed source testing.

OLYMPIC REGION CLEAN AIR AGENCY

DRY KILN EMISSION FACTORS

APRIL 8, 1999

(partial copy containing lumber production emission factors)

OLYMPIC REGION CLEAN AIR AGENCY - DRY KILN FACTORS

(4/8/99)

...\factors\Dry Kiln Factor.doc

Wood Species	Pollutant	Factor Value	Unit of Measure	Footnote No.
Douglas Fir	PM	0.11	lb / MBF (green)	1
	PM-10	0.11	lb / MBF (green)	1, 6
	VOC as Carbon	0.28	lb / MBF (green)	2
	VOC (Total VOC)	0.32	lb / MBF (green)	4
	Pinenes	0.32	lb / MBF (green)	3, 4
	Phenol	0.004	lb / MBF (green)	3, 4
Hemlock	PM	0.04	lb / MBF (green)	1
	PM-10	0.04	lb / MBF (green)	1, 6
	VOC as Carbon	0.12	lb / MBF (green)	2
	VOC (Total VOC)	0.14	lb / MBF (green)	4
	Pinenes	0.14	lb / MBF (green)	3,4
	Phenol	0.002	lb / MBF (green)	3,4
Cedar	(use Hemlock factors)			
Alder	PM	0.11	lb / MBF (green)	1, 5
	PM-10	0.11	lb / MBF (green)	1, 6
	VOC as Carbon	0.26	lb / MBF (green)	2
	VOC (Total VOC)	0.29	lb / MBF (green)	4, 5
	Pinenes	0.29	lb / MBF (green)	3,4,5
	Phenol	0.003	lb / MBF (green)	3,4,5

Notes:

1. PM Factors Ref.: Weyhaeuser Office of the Environment, e-mail from Ken Johnson 3/9/99; also hemlock factor submitted as part of Weyerhaeuser Raymond Air Operating Permit Application 5/95.

1.1 PM factors: $PM = PM_{Filterable} + PM_{Condensable}$

1.2 An emission factor for PM from drying southern yellow pine was derived form an average of Weyerhaeuser test data and data in the NCASI wood products data base. The average total particulate (filterable plus condensable) was 0.097 lb PM/MBF of southern pine dried.

1.3 The emission factor for hemlock and douglas fir was developed with the assumption that the particulate emissions are mostly vaporized wood extractives, and that the amount emitted is proportional to the wood extractive content.

1.4

SPECIES	% EXTRACTIVE CONTENT
Southern Yellow Pine (SYP)	4.8
Douglas Fir (DF)	4.4
Western Hemlock (WH)	1.6

1.5 Calculations e.g. for Douglas Fir:
DF = (0.097 lb PM/MBF SYP)(4.4% DF / 4.8% SYP) = 0.089 lb PM / MBF
A safety factor of 25% was added.
DF = 0.089 lb / MBF + ((0.25)(0.089 lb/MBF) = 0.11 lb PM / MBF Douglas Fir

2. VOC Factors Ref.: Dry Kiln VOC Emissions - Scott Inloes SWAPCA (NOC),– Horizon Engineering – Cowlitz Stud Mill, (12/97) Factors: Douglas Fir – VOC as C 0.28 lb/MBF @ 10% m.c., Hemlock VOC as C 0.12 lb/MBF @ 10% m.c., Alder VOC as C 0.26 lb VOC as C @ 10% m.c.

2.1 VOC measurements were made in a laboratory size lumber dry kiln. VOC was measured with a flame analyzer.

2.2 It appears that a flame ionization analyzer may also measure some of the condensable PM; however it is not clear how much of condensable particulate would be ionized in the detector.

3. VOC composition:

VOC emission species for Douglas Fir = 99% Terpene, 1 % Phenol - OAPCA - NOC - Pacific Veneer / CH2M Hill (2/4/94 letter from CH2M Hill).
Weyerhaeuser-OAPCA - NOC #646 (gives 99% turpentine, 1% phenol)
EPA Air Emissions Species Manual EPA-450/2-88-003a (4/88): 99.9 % wt. pinene isomers MW 136.2 -[species data for veneer dryer]

Factor Pinene Isomers (α - pinene, β - pinene):
(0.28 lb VOC as C / MBF)[(136.2 MW Pinene) / (12 MW C) (10 carbons - pinene)] (99% / 100%) = 0.32 lb pinene isomers / MBF Douglas Fir
Factor Phenol: (0.28 lbs VOC as C / MBF) [(94.1MW Phenol) / (12) (6)] (1 % / 100%) = 0.004 lb phenol / MBF
Factor VOC (Total VOC) = (pinene isomers factor + phenol factor) = 0.324 lb VOC/MBF

4. Pinenes Factor and VOC (Total VOC) Factor – e.g. calculations for Douglas Fir
Factor Pinene Isomers (α - pinene, β - pinene):
(0.28 lb VOC as C / MBF)[(136.2 MW Pinene) / (12 MW C) (10 carbons - pinene)] (99% / 100%) = 0.32 lb pinene isomers / MBF Douglas Fir
Factor Phenol: (0.28 lbs VOC as C / MBF) [(94.1MW Phenol) / (12.01) (6)] (1 % / 100%) = 0.004 lb phenol / MBF
Factor VOC (Total VOC) = (pinene isomers factor + phenol factor) = 0.324 lb VOC/MBF

5. Alder

5.1 PM: Let Alder = Douglas Fir. In the VOC tests (see "2" above) Alder had VOC rates similar to Douglas Fir.

5.2 Pinene isomers, phenol. Let Alder = Douglas Fir

6. PM-10: Assume PM-10 = PM, this is a conservative estimate based on process knowledge, no test data available.

7. Spruce: Let Spruce = Douglas Fir for all emission factors

8. Cedar: VOC emissions for Cedar are similar to Hemlock, Weyco Data, Project # 044-9434, Use Hemlock factors for cedar

9. **Companies wishing to develop their own emission factors, based on direct testing, are encouraged to do so. A stack test protocol must be approved by OAPCA and an OAPCA representative must be present during the test. A test done by companies prior to 4/99, after review, may also be accepted by OAPCA.**

Small-scale Kiln Study Utilizing Ponderosa Pine, Lodgepole Pine, White Fir, and Douglas-fir

Report to

Intermountain Forest Association
P.O. Box 3075
Coeur d'Alene, ID 83816

Report by

Michael R. Milota
Department of Forest Products
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Corvallis, OR 97331

September 29, 2000

TABLE 1. Summary of drying times and total hydrocarbon, methanol, and formaldehyde released. Values are adjusted to 12% moisture content for ponderosa pine and 15% moisture content for the other species.

	Event	Volume (brd ft)	Time to final MC (hrs:min)	VOCs as Carbon			Methanol, (lb/mbf)	Formaldehyde, (lb/mbf)
				(g/event)	(lbs/mbf)	($g/kg_{OD wood}$)		
ponderosa	2	75.68	58:28	48.1	1.40	0.85		
	3	75.68	57:07	44.7	1.30	0.78		
	4	75.68	55:02	47.5	1.29	0.89	0.050	0.0022
	5	75.68	57:04	57.7	1.54	1.06	0.080	0.0036
ponderosa			56:54		1.38	0.89	0.065	0.0029
white fir	1	73.33	36:19	8.49	0.26	0.16		
	2	73.33	43:19	8.84	0.27	0.16		
	3	73.33	42:36	7.43	0.22	0.14	0.096	0.0022
	4	73.33	46:54	8.42	0.25	0.16	0.148	0.0034
white fir ave.			42:17		0.26	0.156	0.122	0.0028
lodgepole	2	80.66	16:34				0.062	0.0041
	3	80.66	16:49	43.7	1.19	0.74		
	4	80.66	16:01	43.0	1.17	0.71	0.063	0.0041
	5	80.66	16:01	32.0	0.87	0.56	0.056	0.0039
lodgepole			16:13		1.08	0.67	0.060	0.0040
Douglas-fir	1	73.33	23:31	17.1	0.51	0.25	0.025	0.00084
	2	73.33	28:28	18.4	0.55	0.28	0.023	0.00079
	3	73.33	27:04	15.0	0.45	0.24	0.026	0.00166
	4	73.33	25:13	15.3	0.46	0.22	0.018	0.00109
Douglas-fir			26:04		0.49	0.25	0.023	0.0010

MRI

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A-98-44

II B 033

Date: June 9, 2000

Subject: Baseline Emissions Estimates for the Plywood and Composite Wood Products Industry
EPA Contract No. 68-D6-0012; EPA Task Order No. 048
MRI Project No. 104803.1.048

From: Katie Hanks and David Bullock

To: Mary Tom Kissell
ESD/WCPG (MD-13)
U. S. Environmental Protection Agency
Research Triangle Park, NC 27711

I. Introduction

The U. S. Environmental Protection Agency (EPA) is developing national emission standards for hazardous air pollutants (NESHAP) for the plywood and composite wood products source category. Plywood and composite wood products include the following: medium density fiberboard (MDF), particleboard, hardboard, fiberboard, oriented strandboard (OSB), softwood plywood and veneer, hardwood plywood and veneer, and engineered wood products (EWP).

The purpose of this memorandum is to document the methodology used to estimate nationwide uncontrolled and baseline air emissions from the plywood and composite wood products source category. Uncontrolled emission estimates are developed without consideration of air pollution controls currently in use at wood products plants. Baseline estimates reflect the level of pollution control that is presently used. Section II of this memorandum discusses the general methodology used to estimate uncontrolled and baseline emissions. Section III discusses in more detail the approach to estimating emissions for various equipment. Section IV presents the nationwide emission estimates, and Section V presents the estimated number of major sources.

II. General Approach

Estimating uncontrolled and baseline emissions involves the following four steps:

(1) Identification of hazardous air pollutant (HAP) emission sources,

(2) Characterization of emission sources (e.g., assignment of throughput and other characteristics),

APPENDIX D

LUMBER KILN EMISSION FACTORS

LUMBER KILN EMISSION FACTORS

General

Lumber kilns are emission sources co-located at plywood and composite wood products plants. Lumber kilns are typically used by sawmills located on the same site with panel plants. Lumber kilns are also used to dry lumber for use in onsite manufacture of engineered wood products.

Lumber kilns are batch units. Lumber is loaded into the kiln, the kiln runs through the drying cycle, and the dried lumber is removed from the kiln when the drying cycle is complete. Softwood lumber kiln drying cycles typically last around 24 hours, while hardwood kiln drying cycles can last from several days to weeks. The emissions profile from lumber kilns depends on kiln drying time, moisture content of the wood, kiln temperature, and air flow through the kiln. The amount and direction of air that is vented from the kiln changes in response to kiln process parameters such as relative humidity, dry bulb temperature, and wet bulb temperature. Lumber kilns have multiple vents, which alternate in function. During any given time, one set of vents allows moisture to exhaust from the kiln while the other set of vents brings in dry air. After some time, the direction of air circulation within the kiln is changed, and the kiln vents exchange functions. Because of these changes in air flow patterns, lumber kiln emission streams vary in flow rate, concentration, and mass emission rate throughout the kiln drying cycle. In addition to emissions from lumber kiln vents, considerable amounts of fugitive emissions may be emitted from lumber kilns through crevices in the kiln wall and around doors.

It is difficult to measure emissions from lumber kilns due to the kiln air flow design and fugitive emissions. Therefore, little emissions test data is available for use in developing emission factors for lumber kilns. Methods for quantifying lumber kiln flow rates vary from test to test. Most of the emissions test data that is available contains calculated flow rates or other assumptions that bring the validity of the data into question. However, a number of studies and tests have been conducted to determine THC emissions from softwood lumber kilns. A few tests have been conducted to determine emissions of HAP from softwood lumber kilns. This appendix summarizes the results on several lumber kiln studies and tests and presents the emission factors used to estimate uncontrolled and baseline emissions from lumber kilns.

Summary of Lumber Kiln Studies

The University of Idaho conducted a bench-scale lumber kiln study where various types of softwood lumber were dried. The results of the Idaho University study were published in NCASI Technical Bulletin No. 718. The purpose of the study was to evaluate the accuracy of Method 25A while obtaining THC measurements for southern and western softwood species using the drying schedules for each species commonly used in full-scale kilns. Total THC emissions for the entire drying cycle (after accounting for fugitive losses from the kiln) for non-pine softwood species ranged from 0.12 to 0.81 pounds as carbon per thousand board feet lb/MBF, while the emissions ranged from 1.86 to 3.32 for pine species. Table D1 presents the

35

THC emissions for each wood species tested. These emission rates are within the range of those reported at full-scale kilns.[1]

TABLE D1. THC EMISSION POTENTIALS FROM LUMBER DRYING[1]

Wood species	THC emissions, lb/MBF (as carbon)
Non-pine species:	
Redwood	0.12
Cedar	0.12
Douglas fir sapwood	0.21
Hemlock	0.24
Coastal Douglas fir	0.34
Grand fir	0.53
White fir	0.57
Douglas fir heartwood	0.81
Non-pine species average	0.37
Pine Species:	
Ponderosa pine	1.86
Sugar pine	2.07
White pine	2.26
Southern yellow pine (AR)	2.36
Southern yellow pine (TX)	3.32
Pine species average	2.37
Overall study average	1.1

MacMillan Bloedel Packaging used another approach to quantify THC emissions from lumber drying operations. Continuous measurement of THC was performed using EPA Method 25A and gas laws and combustion stoichiometry were used to estimate volumetric flow from a steam-heated kiln and a direct natural gas-fired kiln (both drying softwoods). For the steam-heated kiln, moisture lost during the drying cycle was used as the basis for volumetric flow estimations. Kiln moisture loss was determined by collecting kiln condensate and by weighing the wood before and after drying to measure the difference in wood weight due to moisture loss. For the natural gas-fired kiln, combustion stoichiometry and measured moisture loss were used to estimate volumetric flow rate from the kiln. The THC emission factors developed based on the measured THC concentrations and calculated flow rates were 1.7 lb/MBF for the steam-heated kiln and 1.4 lb/MBF for the direct gas-fired kiln. These emission factors are consistent with those obtained by directly measuring kiln flow rate.[2]

Temple-Inland Forest Products conducted testing to measure THC, methanol, and formaldehyde emissions from two softwood lumber kilns (one steam-heated kiln and one direct-fired kiln) using a water mass balance (WMB) approach. Emissions of THC were measured using EPA Method 25A. The EPA Method 308 (modified) was used to measure formaldehyde and methanol. The WMB approach is based on the concept that the mass of water entering the kiln equals the mass of water exiting the kiln. Sources of water introduced into the kiln are moisture in the lumber and air, and for direct-fired kilns, moisture in the fuel and water generated from combustion. The mass of water exiting the kiln through the kiln vents and fugitive sources is calculated from the difference of the water entering the kiln and exiting the kiln in the dried lumber and kiln condensate. The pollutant concentration and calculated moisture content of gas emitted from the kiln are used to calculate the pollutant mass emission rate. (The WMB approach assumes that the moisture and pollutant concentration in the vent gas and fugitive gas are the same.) The emission factors developed based on the Temple-Inland test results are presented in Table D2. The gas moisture, methanol, and formaldehyde data from the direct-fired kiln mill were inconsistent and were determined to be invalid.[3]

TABLE D2. SUMMARY OF TEST RESULTS OBTAINED WITH WATER MASS BALANCE APPROACH[3]

Pollutant	Steam-heated softwood kiln	Direct-fired softwood kiln
THC as C, lb/MBF	1.88	2.49
Methanol, lb/MBF	0.26	invalid
Formaldehyde, lb/MBF	0.025	invalid

In addition to the studies outlined above, the NCASI has developed a draft data base of lumber kiln emission test results.[4] The data base contains test results for softwood lumber kilns only. Emission factors for THC and some HAP's reported in the draft database were averaged and are presented in Table D3. The THC emissions were measured using Method 25A. Method TO-5 was used to determine aldehyde and ketone emissions, and method TO-8 was used to determine phenol emissions. The draft NCASI data base includes comments for most of the tests summarized in the data base. Tests with suspect results (as indicated in the NCASI comments) were not included in the averages presented in Table D3. After elimination of the suspect emission factors, the averages in Table D3 were calculated by first averaging all of the emission factors for each individual kiln (if more then one test was performed at the kiln), and then averaging the factors for all kilns for each pollutant. The emission factors in Table D3 compare with those developed using data from the other studies discussed above.

TABLE D3. AVERAGE EMISSION FACTORS IN THE NCASI DRAFT LUMBER KILN DATABASE[4]

Pollutant	Softwood, direct-fired kilns, lb/MSF	Softwood, steam-heated kiln, lb/MSF
THC	2.4	2.3
Acetaldehyde	0.041	0.0078
Formaldehyde	0.034	0.0043
MEK	0.0080	0.00129
Phenol	0.010	Below detection limit

Georgia-Pacific sponsored a lumber kiln study performed by NCASI to examine the potential for measuring emissions from small-scale lumber kilns and using the results to estimate emissions from full-scale kilns. The study consisted of two phases. The purpose of the first phase of the study was to evaluate the variability among four different small-scale kilns and among sampling events at the individual small-scale kilns. The second phase of the study was to compare the emission test results from two full-scale kilns (one direct-fired and one indirect-fired) to the test results from two small-scale kilns. All of the small-scale kilns in the study are heated by indirect means. All of the kilns (small- and full-scale) were used to dry southern pine lumber. Draft results from the Georgia-Pacific lumber kiln study were reviewed. The total HAP and VOC emission test results were determined to be of the same magnitude as the emission factors used for the baseline emission estimates (discussed below). The final report documenting the Georgia-Pacific lumber kiln study was not available as of this writing. Therefore, the results of the study were not incorporated into the baseline emission estimates for lumber kilns. The results from the Georgia-Pacific lumber kiln study will eventually be included in the NCASI draft lumber kiln data base and the data base will be further refined (i.e., new data will be added and values that could not be recalculated by NCASI will be removed). The result will be a comprehensive summary on emissions from lumber kilns.[5,6]

Emission test data for hardwood lumber kilns is not available. Hardwood lumber is dried at a lower temperature for longer amounts of time than is softwood lumber. Therefore, hardwood lumber kilns are likely to have a very different emissions profile than softwood lumber kilns. For comparison, consider the differences in hardwood and softwood veneer dryers. Hardwood veneer dryers operate at temperatures approximately 100 degrees lower than softwood veneer dryers. Hardwood veneer dryers typically emit less THC and less HAP than softwood veneer dryers. Thus, it is reasonable to believe that hardwood lumber kilns emit less THC and HAP than softwood lumber kilns.

Emission Factors Used to Estimate Baseline Emissions

Emission factors were developed based on the results of the studies discussed above. The resulting emission factors are presented in Table D4. The ratio of hardwood veneer dryer to softwood veneer dryer emissions (for indirect-fired veneer dryer heated zones) was used to approximate emission factors for indirect-fired hardwood lumber kilns. Approximation of direct-fired, hardwood lumber kiln emission factors was not necessary because there are no known direct-fired, hardwood lumber kilns.

TABLE D4. LUMBER KILN EMISSION FACTORS

Pollutant	Reference	lb/MBF for each kiln type		
		DFIRE (SW)	IHEAT (SW)	IHEAT (HW)
THC	NCASI data base	2.4	2.3	
	Tech. Bull 718		1.14	
	MacMillan Bloedel	1.4	1.7	
	Temple-Inland	2.49	1.88	
	Average THC	2.1	1.8	0.26
Acetaldehyde	NCASI data base	0.041	0.0078	0.0019
Formaldehyde	NCASI data base	0.034	0.0043	
	Temple Inland	0.025		
	Average HCHO	0.030	0.0043	0.00034
MEK	NCASI data base	0.0080	0.0013	no ratio[b]
Phenol	NCASI data base	0.010	BDL	BDL
Methanol	Temple Inland	0.26	0.22[a]	0.22
Total HAP		0.35	0.24	0.23

DFIRE - direct-fired; IHEAT - indirect-fired; SW - softwood; HW - hardwood.

[a] The ratio of the direct-fired softwood THC and indirect-fired hardwood THC emission factors was applied to arrive at an estimated methanol emission factor for indirect-fired lumber kilns.

[b] Emissions of MEK were below detection limit (BDL) for the hardwood and softwood veneer dryers used to ratio the emission factors for hardwood lumber kilns.

References

1. *A Small-Scale Study on Method 25A Measurements of Volatile Organic Compound Emissions From Lumber Drying*, NCASI Technical Bulletin No. 718, July 1996.

2. Glass, M., and D. Elam. "Innovative Procedures to Quantify Volatile Organic Compound Emission From Lumber Kilns," 1995 TAPPI International Environmental Conference Proceedings, Book 1, p. 215.

3. *Lumber Kiln Emissions Testing*, Diboll and Buna, Texas, Test Dates January 20-23, 1998 (Diboll) and January 26-29, 1998 (Buna), prepared for Temple-Inland Forest Products Corporation, by Roy F. Weston, Inc., Work Order No. 06598-011-001, April 1, 1998.

4. Letter from D. Word, NCASI, to R. Marinshaw, MRI. April 21, 1995. Transmittal of the NCASI draft lumber kiln data base.

5. R. Nicholson and K. Hanks, MRI, to P. Lassiter, EPA/ESD. January 27, 1998. Minutes of January 26, 1998 Meeting With Representatives from the Wood Products Industry and Trade Associations.

6. K. Hanks, MRI, to M. Kissell, EPA/ESD. November 18, 1999. Minutes of a November 16, 1999 Meeting with Wood Products Industry and Trade Association Representatives.

Potlatch Corporation

Clearwater Wood Products

Process Cyclone Emission Factors

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-1, SPECIALTIES, GANG RIP, Assuming Particlesize Distribution for Cedar Sawdust

15% Moisture

INPUT DATA

Body Length, L1	7.00000	
Cone Length, L2	12.00000	
Inlet width, B	1.50000 ft	
Inlet height, H	2.50000 ft	
Outlet diameter, Do	4.00000 ft	
Eff. No. of Turns, Ne	5.20000	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	13231.00000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	

CALCULATED RESULTS

Inlet Velocity, Vi	58.80444 ft/sec
Inlet Velocity Head, Hv	0.76885 in. H2O
Pressure Drop, PD	2.16238 in. H2O
Cut Size, Dpc	10.18871 microns

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.4907	20	0.0002
10-45	27.5	0.07700	2.6991	85	0.0655
45-75	60	0.89100	5.8889	97	0.8643
75-106	90.5	0.00900	8.8824	100	0.0090
106-125	115.5	0.05800	11.3361	100	0.0580
125-150	137.5	0.77500	13.4953	100	0.7750
>150	150	98.18924	14.7222	100	98.1892
		100.00000			99.9611

Emission factor = 0.7778 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-2, SPECIALTIES, GANG RIP, Assuming Particlesize Distribution for Cedar Sawdust

15% Moisture

INPUT DATA		
Body Length, L1	7.00000	
Cone Length, L2	8.00000	
Inlet width, B	1.17000 ft	
Inlet height, H	1.67000 ft	
Outlet diameter, Do	3.00000 ft	
Eff. No. of Turns, Ne	6.58683	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	10104.00000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	
CALCULATED RESULTS		
Inlet Velocity, Vi	86.18660 ft/sec	
Inlet Velocity Head, Hv	1.65158 in. H2O	
Pressure Drop, PD	4.30269 in. H2O	
Cut Size, Dpc	6.60413 microns	

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.7571	35	0.0003
10-45	27.5	0.07700	4.1641	90	0.0693
45-75	60	0.89100	9.0852	100	0.8910
75-106	90.5	0.00900	13.7036	100	0.0090
106-125	115.5	0.05800	17.4891	100	0.0580
125-150	137.5	0.77500	20.8203	100	0.7750
>150	150	98.18924	22.7131	100	98.1892
		100.00000			99.9918

Emission factor = 0.1639 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-3, SPECIALTIES, GRECON Assuming Particlesize Distribution for Cedar Sawdust

15% Moisture

INPUT DATA		
Body Length, L1	7.00000	
Cone Length, L2	8.00000	
Inlet width, B	1.17000 ft	
Inlet height, H	1.67000 ft	
Outlet diameter, Do	3.00000 ft	
Eff. No. of Turns, Ne	6.58683	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	10337.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	
CALCULATED RESULTS		
Inlet Velocity, Vi	88.17408 ft/sec	
Inlet Velocity Head, Hv	1.72863 in. H_2O	
Pressure Drop, PD	4.50342 in. H_2O	
Cut Size, Dpc	6.52927 microns	

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.7658	35	0.0003
10-45	27.5	0.07700	4.2118	90	0.0693
45-75	60	0.89100	9.1894	100	0.8910
75-106	90.5	0.00900	13.8607	100	0.0090
106-125	115.5	0.05800	17.6896	100	0.0580
125-150	137.5	0.77500	21.0590	100	0.7750
>150	150	98.18924	22.9735	100	98.1892
		100.00000			99.9918
				Emission factor =	0.1639 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-4, SPECIALTIES, NULOC, Assuming Particle Size Distribution for Cedar Sawdust
15% Moisture

INPUT DATA		
Body Length, L1	6.0000	
Cone Length, L2	12.0000	
Inlet width, B	1.1600 ft	
Inlet height, H	2.0000 ft	
Outlet diameter, Do	3.0000 ft	
Eff. No. of Turns, Ne	6.00000	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	7196.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	
CALCULATED RESULTS		
Inlet Velocity, Vi	51.69540 ft/sec	
Inlet Velocity Head, Hv	0.59419 in. H2O	
Pressure Drop, PD	1.83802 in. H2O	
Cut Size, Dpc	8.89627 microns	

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.5620	25	0.0002
10-45	27.5	0.07700	3.0912	90	0.0693
45-75	60	0.89100	6.7444	98	0.8732
75-106	90.5	0.00900	10.1728	100	0.0090
106-125	115.5	0.05800	12.9830	100	0.0580
125-150	137.5	0.77500	15.4559	100	0.7750
>150	150	98.18924	16.8610	100	98.1892
		100.00000			99.9739

Emission factor = 0.5218 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-5, SPECIALTIES, FROM C-1, C-2, C-3, Assuming Particle Size Distribution for Cedar Sawdust
15% Moisture

INPUT DATA

Body Length, L1	7.00000	
Cone Length, L2	7.00000	
Inlet width, B	1.00000 ft	
Inlet height, H	2.00000 ft	
Outlet diameter, Do	3.00000 ft	
Eff. No. of Turns, Ne	5.25000	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	11394.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	

CALCULATED RESULTS

Inlet Velocity, Vi	94.95000 ft/sec
Inlet Velocity Head, Hv	2.00452 in. H2O
Pressure Drop, PD	5.34538 in. H2O
Cut Size, Dpc	6.51558 microns

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.7674	35	0.0003
10-45	27.5	0.07700	4.2207	90	0.0693
45-75	60	0.89100	9.2087	100	0.8910
75-106	90.5	0.00900	13.8898	100	0.0090
106-125	115.5	0.05800	17.7267	100	0.0580
125-150	137.5	0.77500	21.1033	100	0.7750
>150	150	98.18924	23.0217	100	98.1892
		100.00000			99.9918

Emission factor = 0.1639 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-6, SPECIALTIES, PLANER 15, Assuming Particle Size Distribution for Cedar Planer Shavings, 15% Moisture

INPUT DATA		
Body Length, L1	7.00000	
Cone Length, L2	7.00000	
Inlet width, B	1.00000 ft	
Inlet height, H	1.50000 ft	
Outlet diameter, Do	2.50000 ft	
Eff. No. of Turns, Ne	7.00000	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	9000.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	78.00000 lb/cf	
Gas density @STP	0.07500 lb/scf	
CALCULATED RESULTS		
Inlet Velocity, Vi	100.00000 ft/sec	
Inlet Velocity Head, Hv	2.22341 in. H2O	
Pressure Drop, PD	6.40342 in. H2O	
Cut Size, Dpc	5.49834 microns	

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00045	0.9094	45	0.0002
10-45	27.5	0.05000	5.0015	97	0.0485
45-75	60	0.21100	10.9124	100	0.2110
75-106	90.5	0.00700	16.4595	100	0.0070
106-125	115.5	0.01400	21.0064	100	0.0140
125-150	137.5	0.14000	25.0076	100	0.1400
>150	150	99.57755	27.2810	100	99.5776
		100.00000			99.9983

Emission factor = 0.0349 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-18, SURFACING, 4 SPLITTER, Assumes Particle Size Distribution for Cedar Sawdust 15% Moisture

INPUT DATA

Body Length, L1	5.33000		
Cone Length, L2	10.00000		
Inlet width, B	1.17000	ft	
Inlet height, H	2.00000	ft	
Outlet diameter, Do	3.00000	ft	
Eff. No. of Turns, Ne	5.16500		
Constant K	12.00000		
Absolute viscosity, u	0.00001	lb mass/sec-ft	
Gas flow rate, q	7196.0000	acfm	
Temperature, Ti	70.00000	deg. F	1.0000
Particle density, p	78.00000	lb/cf	
Gas density @STP	0.07500	lb/scf	

CALCULATED RESULTS

Inlet Velocity, Vi	51.25356	ft/sec
Inlet Velocity Head, Hv	0.58958	in. H2O
Pressure Drop, PD	1.83950	in. H2O
Cut Size, Dpc	9.67111	microns

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.5170	20	0.0002
10-45	27.5	0.07700	2.8435	85	0.0655
45-75	60	0.89100	6.2040	98	0.8732
75-106	90.5	0.00900	9.3578	100	0.0090
106-125	115.5	0.05800	11.9428	100	0.0580
125-150	137.5	0.77500	14.2176	100	0.7750
>150	150	98.18924	15.5101	100	98.1892
		100.00000			99.9700

Emission factor = 0.5996 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-25, SURFACING, BROOKS CHIPPER, Assumes Particle Size Distribution for Chips >30% Moisture

INPUT DATA		
Body Length, L1	3.50000	
Cone Length, L2	8.00000	
Inlet width, B	1.00000 ft	
Inlet height, H	1.00000 ft	
Outlet diameter, Do	3.00000 ft	
Eff. No. of Turns, Ne	7.50000	
Constant K	12.00000	
Absolute viscosity, u	0.00001 lb mass/sec-ft	
Gas flow rate, q	5451.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	62.40000 lb/cf	
Gas density @STP	0.07500 lb/scf	
CALCULATED RESULTS		
Inlet Velocity, Vi	90.85000 ft/sec	
Inlet Velocity Head, Hv	1.83514 in. H2O	
Pressure Drop, PD	2.44685 in. H2O	
Cut Size, Dpc	6.23078 microns	

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00054	0.8025	40	0.0002
10-45	27.5	0.05500	4.4136	95	0.0523
45-75	60	0.12900	9.6296	100	0.1290
75-106	90.5	0.00500	14.5247	100	0.0050
106-125	115.5	0.01500	18.5370	100	0.0150
125-150	137.5	0.11200	22.0679	100	0.1120
>150	150	99.68346	24.0740	100	99.6835
		100.00000			99.9969

Emission factor = 0.0615 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-26, SAWMILL, ALL MACHINE CENTERS, Assumes Particle Size Distribution for Cedar Sawdust, >30% Moisture

INPUT DATA

Body Length, L1	6.00000	
Cone Length, L2	12.00000	
Inlet width, B	1.50000 ft	
Inlet height, H	3.00000 ft	
Outlet diameter, Do	2.50000 ft	
Eff. No. of Turns, Ne	4.00000	
Constant K	12.00000	
Absolute viscosity, u	1.24E-05 lb mass/sec-ft	
Gas flow rate, q	51000.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	62.40000 lb/cf	
Gas density @STP	0.07500 lb/scf	

CALCULATED RESULTS

Inlet Velocity, Vi	188.88889 ft/sec
Inlet Velocity Head, Hv	7.93291 in. H2O
Pressure Drop, PD	68.54032 in. H2O
Cut Size, Dpc	7.24683 microns

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.6900	30	0.0002
10-45	27.5	0.07700	3.7948	90	0.0693
45-75	60	0.89100	8.2795	100	0.8910
75-106	90.5	0.00900	12.4882	100	0.0090
106-125	115.5	0.05800	15.9380	100	0.0580
125-150	137.5	0.77500	18.9738	100	0.7750
>150	150	98.18924	20.6987	100	98.1892
		100.00000			99.9918

Emission factor = 0.1646 lb/ton

CYCLONE DESIGN - PRESSURE DROP AND EFFICIENCY

CW-CY-27A, AND 27B, SAWMILL, ALL MACHINE CENTERS, Assumes Particle Size Distribution for Cedar Sawdust, >30% Moisture

INPUT DATA

Body Length, L1	8.00000	
Cone Length, L2	14.00000	
Inlet width, B	1.33000 ft	
Inlet height, H	5.00000 ft	
Outlet diameter, Do	3.00000 ft	
Eff. No. of Turns, Ne	3.00000	
Constant K	12.00000	
Absolute viscosity, u	1.24E-05 lb mass/sec-ft	
Gas flow rate, q	32500.0000 acfm	
Temperature, Ti	75.00000 deg. F	0.9907
Particle density, p	62.40000 lb/cf	
Gas density @STP	0.07500 lb/scf	

CALCULATED RESULTS

Inlet Velocity, Vi	81.45363 ft/sec
Inlet Velocity Head, Hv	1.47516 in. H2O
Pressure Drop, PD	13.07979 in. H2O
Cut Size, Dpc	11.99901 microns

REMOVAL EFFICIENCY

Size Range microns	Average Size (Dp) microns	Weight Distribution (percent)	Dp/Dpc	Removal Efficiency (percent)	Overall Efficiency (percent)
0-10	5	0.00076	0.4167	15	0.0001
10-45	27.5	0.07700	2.2919	85	0.0655
45-75	60	0.89100	5.0004	97	0.8643
75-106	90.5	0.00900	7.5423	99	0.0089
106-125	115.5	0.05800	9.6258	100	0.0580
125-150	137.5	0.77500	11.4593	100	0.7750
>150	150	98.18924	12.5010	100	98.1892
		100.00000			99.9610

Emission factor = 0.7803 lb/ton

Appendix E

Response to Public Comments

P-050200

Response to Public Comments
Submitted During the Public Comment Period
for Potlatch Corporation, Clearwater Wood Products, Lewiston
Permit to Construct No. P-050200
Facility ID No. 069-00003

As required by IDAPA 58.01.01.209.01.c of the Rules for the Control of Air Pollution in Idaho (Rules), the Idaho Department of Environmental Quality (DEQ) provided proposed Permit to Construct (PTC) No. P-050200 for Potlatch Corporation, Clearwater Wood Products (Potlatch Clearwater) located in Lewiston, for public notice and comment. Public comment packages, which included the application materials, the proposed permit, and the associated air quality statement of basis, were made available for public review at DEQ's Lewiston Regional Office, Lewiston Public Library, and DEQ's state office in Boise. A copy of the proposed PTC No. P-050200 and the statement of basis was also posted on DEQ's Web site. The public comment period for the PTC was provided from June 29 through July 29, 2005.

The following is a summary list of all documents received from the public containing comments on the above referenced permit action.

1. Mark Solomon e-mail to DEQ, dated July 18, 2005

This section provides the air quality related comments submitted on the proposed action and DEQ's responses to those comments. Based on the application materials and the Rules, DEQ has responded only to those comments that directly relate to the air quality aspects of the permit.

Comments taken from Mark Solomon e-mail, dated July 18, 2005

Comment No. 1

Potlatch is seeking to replace its 32 older masonry kilns with four new kilns. While I appreciate the efficiencies the company may achieve with new kilns, the attendant increases in air pollution emissions created by increasing production throughput are unacceptable.

Although Clearwater Wood Products (CWP) considers itself distinct for air permitting purposes from the Idaho Pulp and Paper Division (IPPD) and Consumer Products Division (CPD), they allege, and Idaho DEQ appears to agree, that all sources of particular pollutant parameters, regardless of division of origin, are accounted for in any project analysis. This proposal is the first from CWP since the facility separation occurred and as such should serve as an interesting look at the reality of air pollution emissions limitations at Potlatch.

DEQ Response to Comment No. 1

Potlatch's application materials propose the construction of four new lumber drying kilns and short-term concurrent operation of the proposed four kilns with the 32 existing drying kilns. The increase in emissions of regulated air pollutants, which include hazardous air pollutants (HAPs), toxic air pollutants (TAPs), and criteria air pollutants, associated with the kiln replacement project have been reviewed by DEQ and determined to meet the regulatory criteria necessary for DEQ to issue a Permit to Construct (PTC) for the proposed project at the CWP facility.

To receive a permit, as per IDAPA 58.01.01.203.02., CWP was required to demonstrate "the stationary source or modification would not cause or significantly contribute to a violation of any ambient air quality standard." The CWP facility conducted ambient impact dispersion modeling for the project's emissions of criteria air pollutants from the lumber drying kilns, process cyclones and baghouses, and the IPPD No. 4 Power Boiler. If the impact of the proposed project at a given receptor is below the significant contribution level, the source cannot cause or significantly contribute to a violation, regardless of the estimated impact from the existing operations. The impacts of the kiln project were below the significant contribution level at all receptor locations except for a limited number along the property boundary. For those few receptors, facility-wide modeling was conducted to assess compliance with National Ambient Air Quality Standards (NAAQS). When results of this modeling were combined with an appropriate background concentration value, based on nearby ambient air monitoring results, all concentrations were below the annual and 24-hour PM_{10} NAAQS. This analysis demonstrated that the kiln project would not cause or significantly contribute to a violation of an ambient air quality standard. Therefore, the impacts are determined acceptable as defined by law.

Comment No. 2

Absent in the application, DEQ technical analysis and the proposed permit is mention of the MACT 1, Phase 2 requirements for control of HVLC pollutants such as methanol that are common to both CWP and IPPD/CPD. Potlatch is currently trying to fool the state into believing that the two aerators added to the ASB were constructed to primarily reduce air emission of methanol instead of decreasing the BOD of the final effluent discharge despite the clear record:

"Because of the anticipated additional BOD load from Phase 1 condensate treatment, two additional aerators were installed after 1993 and prior to 2001" (URS meeting notes 6/4/04)

The issue at hand is the requirement under MACT for the facility to reduce methanol emissions. Whether or not DEQ buys into Potlatch's fable that they have already met that requirement under their Clean Condensate Alternative (CCA), the fact of the matter is that by this application, Potlatch will increase methanol emissions by 10.03 tpy (DEQ Air Quality Permitting Statement of Basis, 6/14/05) or a full 13.15% of the "credit" Potlatch is claiming under CCA.

There are also potentially unaccounted for emissions to air from wastewater not accounted for in the application. In its application for a NPDES permit, Potlatch attributed .74 mgd of wastewater to CWP. In its CCA presentation to DEQ on 6/4/04, Potlatch's consultant URS presented that methanol air emissions from the ASB range from 1-300 ppm. To my knowledge, the source and makeup of the CWP waste stream has never been identified in publicly available documents. It is my understanding that the only place where the volume listed as discharged enters CWP is as steam for the dry kilns. It is highly unlikely that it leaves as uncontaminated condensate as it would be economically foolish to discharge clean heated water. DEQ must require an analysis of this waste stream, (shown as being delivered to the primary clarifier in EPA NPDES Fact Sheet), to determine if there is more methanol being emitted to the air from this unaccounted source and whether the volume so emitted then rises above thresholds of concern for CWP under its "separate" facility determination.

Additionally, the CCA proposal must be examined in light of the increased methanol volume of the increased dry kiln throughput and any "unaccounted" sources of methanol as just discussed.

DEQ Response to Comment No. 2

The proposed permit that has been issued for public comment is for the Potlatch Clear Water Wood Products facility. All of the regulations and potential sources of air pollution mentioned in Comment No. 2 are for the Potlatch Pulp and Paper facility. These two facilities are completely separate for air pollution permitting purposes. In short Comment No. 2 does not pertain to the proposed permitting action that was open for public comment.

If the clean condensate alternative is found to be a applicable to the Pulp and Paper facility the Tier I operating permit for the Pulp and Paper facility will be renewed to include it's requirements. A draft of the renewed Tier I operating permit for the Pulp and Paper facility will be made available for public comment in accordance with the *Rules for the Control of Air Pollution in Idaho* (IDAPA 58.01.01.364).

Comment No. 3

For the record, I ask that the previous record on air modeling contained in Contested Case Docket # 0101-03-01, be included in this proceeding. To sum that record, air models used to determine compliance with NAAQS are unable to account for the placement of a large industrial facility at the bottom of a 2000' deep canyon that has been demonstrated to have diurnal spikes in pollutant levels caused by temperature capping as well as full atmospheric inversions attributable to larger weather patterns.

DEQ Response to Comment No. 3

AERMOD and ISC, the models used for assessing air pollutant impacts from the kiln replacement project, perform reasonably well at assessing impacts from the Potlatch facilities in the immediate area under most atmospheric conditions. However, the commenter is correct in that these models cannot estimate impacts for stagnation periods, characterized by winds less than 1.0 meters per second and a strong temperature inversion. More complex, non-steady state models, such as CALPUFF or CMAQ, are needed to assess impacts during low wind, inversion periods. DEQ is considering the need for such modeling in the area to assess the impacts from the Potlatch facilities, other industrial facilities, and area/mobile pollutant sources (cars, home heating, etc.), and is assessing DEQ's capability, staff availability, and budget for conducting such analyses.